THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant(s): Cupp et al.
Appl. No.: 10/037,941
Conf. No.: 7917
Filed: January 3, 2002
Title: DENTAL DIET FOR REDUCING TARTAR
Art Unit: 1761
Examiner: K. Hendricks
Docket No.: 115808-330

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Commissioner for Patents
P.O. Box 1450
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APPELLANTS' APPEAL BRIEF

Sir:

Appellants submit this Appeal Brief in support of the Notice of Appeal filed on September 5, 2006. This Appeal is taken from the Final Rejection in the Office Action dated May 5, 2006.

I. REAL PARTY IN INTEREST

The real party in interest for the above-identified patent application on Appeal is Nestec, Ltd. by virtue of an Assignment dated April 11, 2002 and recorded at reel 012799, frame 0748 in the United States Patent and Trademark Office.

II. RELATED APPEALS AND INTERFERENCES

Appellants' legal representative and the Assignee of the above-identified patent application do not know of any prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision with respect to the above-identified Appeal.

III. STATUS OF CLAIMS

Claims 1-33 are pending in the above-identified patent application. Claims 1-33 stand rejected. Therefore, Claims 1-33 are being appealed in this Brief. A copy of the appealed claims is included in the Claims Appendix.

IV. STATUS OF AMENDMENTS

A final Office Action was mailed on May 5, 2006. Appellants filed a Response on August 4, 2006 in reply to the final Office Action and made no amendments to the claims. In the Response, Appellants attached an Affidavit under 37 C.F.R. §1.132. An Advisory Action was mailed on August 24, 2006. In the Advisory Action, the Examiner maintained the anticipation and obviousness rejections. Furthermore, in the Advisory Action, the Examiner did not enter the Affidavit under 37 C.F.R. §1.132. A copy of the final Office Action and the Advisory Action are attached as Exhibit A and Exhibit B, respectively, in the Evidence Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A summary of the invention by way of reference to the specification and/or figures for each of the independent claims is provided as follows:

Independent Claim 1 is directed to a dried pet food comprising a matrix comprising a protein source, a carbohydrate source, insoluble fiber (page 3, lines 9-14; page 5, lines 1-3) and the dried pet food having an unstriated appearance (page 8, lines 20-24) and comprising a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm (page 3, lines 13-14 and 18), the length being greater than the thickness (pages 10-11, Examples 1 and 2) wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5).

Independent Claim 7 is directed to a dried pet food comprising a matrix comprising a protein source, a carbohydrate source, an insoluble fiber (page 3, lines 9-14; page 5, lines 1-3) and the dried pet food having an unstriated appearance (page 8, lines 20-24) and a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dried pet food comprises a thickness of at least 12 mm (page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 13 is directed to a dried pet food comprising a matrix comprising a protein source, a carbohydrate source, insoluble fiber (page 3, lines 9-14; page 5, lines 1-3), a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5) and the dried pet food comprising a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm (page 3, lines 13-14 and 18), wherein the length is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 18 is directed to a dried pet food comprising at least 25% by weight of a kibble having an unstriated appearance (page 8, lines 20-24) and comprising a matrix having a protein source, carbohydrate source, insoluble fiber (page 3, lines 9-14; page 5, lines 1-3), and a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dried pet food comprises a thickness of at least 12 mm (page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 20 is directed to a method of reducing calculus and plaque build-up on a pet's teeth comprising the steps of feeding a dried pet food to a pet; and chewing by the pet

on the dried pet food having an unstriated appearance (page 8, lines 20-24) and comprising a matrix including a protein source, a carbohydrate source, insoluble fiber (page 3, lines 9-14; page 5, lines 1-3), and having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dried pet food comprises a thickness of at least 12 mm (page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 21 is directed to a pet food comprising at least two different sized kibbles including a first sized kibble and a second sized kibble wherein the first sized kibble is larger in size than the second sized kibble (page 5, lines 14-15), wherein the first sized kibble and the second sized kibble are present in a ratio of approximately 20 to about 80% to approximately 80 to about 20% (page 5, lines 15-16), and at least one kibble having an unstriated appearance (page 8, lines 20-24) and a density that ranges from about 16.8 lbs/ft^3 to about 20 lb/ft^3 (page 5, lines 5).

Independent Claim 25 is directed to a method for making a dry pet food comprising the steps of extruding through a non-laminar flow (page 8, lines 17-19) a protein source, carbohydrate source, and an insoluble fiber source (page 3, lines 9-14; page 5, lines 1-3) to create a dry pet food having an unstriated appearance (page 8, lines 20-24) and having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dry pet food comprises a thickness of at least 12 mm (page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 28 is directed to a dried pet food comprising a protein source, a carbohydrate source, an insoluble fiber source (page 3, lines 9-14; page 5, lines 1-3) and having an inner cellular structure that is created by a non-laminar flow extrusion process (page 8, lines 17-19) wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dried pet food comprises a thickness of at least 12 mm (page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Independent Claim 31 is directed to a dried pet food comprising a protein source, a carbohydrate source, an insoluble fiber source (page 3, lines 9-14; page 5, lines 1-3) and having an inner cellular structure that is characterized by a number of microscopic air pockets (page 8, lines 24-25) wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 (page 5, lines 5), wherein the dried pet food comprises a thickness of at least 12 mm

(page 3, lines 13-14 and 18) and a length that is greater than the thickness (pages 10-11, Examples 1 and 2).

Although specification citations are given in accordance with C.F.R. 1.192(c), these reference numerals and citations are merely examples of where support may be found in the specification for the terms used in this section of the Brief. There is no intention to suggest in any way that the terms of the claims are limited to the examples in the specification. As demonstrated by the references numerals and citations, the claims are fully supported by the specification as required by law. However, it is improper under the law to read limitations from the specification into the claims. Pointing out specification support for the claim terminology as is done here to comply with rule 1.192(c) does not in any way limit the scope of the claims to those examples from which they find support. Nor does this exercise provide a mechanism for circumventing the law precluding reading limitations into the claims from the specification. In short, the references numerals and specification citations are not to be construed as claim limitations or in any way used to limit the scope of the claims.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 7-12, 18, 20, 25, 27, 28 and 30-33 are rejected under 35 U.S.C. §102(b) as anticipated by EP 0645095 to Collings et al. (*"Collings"*). A copy of *Collings* is attached herewith as Exhibit C in the Evidence Appendix.
2. Claims 1-6, 13-17, 19, 21-24, 26 and 29 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Collings* in view of U.S. Patent No. 5,431,927 to Hand et al.(*"Hand"*). A copy of *Hand* is attached herewith as Exhibit D in the Evidence Appendix.

VII. ARGUMENT

A. LEGAL STANDARDS

1. Anticipation under 35 U.S.C. § 102

Anticipation is a factual determination that "...requires the presence in a single prior art disclosure of each and every element of a claimed invention." *Lewmar Marine, Inc. v. Barient, Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987). Moreover, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a *single* prior art reference." *Verdegaal Bros. v. Union Oil of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987)(*emphasis added*).

Federal Circuit decisions have repeatedly emphasized the notion that anticipation cannot be found where less than all elements of a claimed invention are set forth in a reference. *See, e.g. Transclean Corp. v. Bridgewood Services, Inc.*, 290 F.3d 1364 (Fed. Cir. 2002). In this regard, a reference disclosing "substantially the same thing" is not enough to anticipate. *Jamesbury Corp. v. Litton Indust. Prod., Inc.*, 756 F.2d 1556, 1560 (Fed. Cir. 1985). A reference must clearly disclose each and every limitation of the claimed invention before anticipation may be found.

Further, anticipation cannot be shown by combining more than one reference to show the elements of the claimed invention. *In re Saunders*, 444 F.2d 599 (C.C.P.A. 1971). All elements of a claimed invention must be disclosed in one, solitary reference. As such, it is clear that a reference cannot be utilized to render a claimed invention anticipated without identical disclosure.

2. Obviousness under 35 U.S.C. § 103

The Federal Circuit has held that the legal determination of an obviousness rejection under 35 U.S.C. § 103 is:

> whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made...The foundational facts for the prima facie case of obviousness are: (1) the scope and content of the prior art; (2) the difference between the prior art and the claimed invention; and (3) the level of ordinary skill in the art...Moreover, objective indicia such as commercial success and long felt need are relevant

> to the determination of obviousness...Thus, each obviousness determination rests on its own facts.

In re Mayne, 41 U.S.P.Q. 2d 1451, 1453 (Fed. Cir. 1997).

In making this determination, the Patent Office has the initial burden of proving a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q. 2d 1955, 1956 (Fed. Cir. 1993). This burden may only be overcome "by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings." *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1988). "If the examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent." *In re Oetiker*, 24 U.S.P.Q. 2d 1443, 1444 (Fed. Cir. 1992).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference or references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *In re Fine*, 837 F.2d 1071, 5, U.S.P.Q.2d 1596 (Fed. Cir. 1988). Second, there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Finally, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q., 580 (CCPA 1974).

Further, the Federal Circuit has held that it is "impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." *In re Fritch*, 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992). "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988).

Moreover, the Federal Circuit has held that "obvious to try" is not the proper standard under 35 U.S.C. §103. *Ex parte Goldgaber*, 41 U.S.P.Q.2d 1172, 1177 (Fed. Cir. 1996). "An-obvious-to-try situation exists when a general disclosure may pique the scientist curiosity, such that further investigation might be done as a result of the disclosure, but the disclosure itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued." *In re Eli Lilly and Co.*, 14 U.S.P.Q.2d 1741, 1743 (Fed. Cir. 1990).

Of course, references must be considered as a whole and those portions teaching against or away from the claimed invention must be considered. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve Inc.*, 796 F.2d 443 (Fed. Cir. 1986). "A prior art reference may be considered to teach away when a person of ordinary skill, upon reading the reference would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Applicant." *Monarch Knitting Machinery Corp. v. Fukuhara Industrial Trading Co., Ltd.*, 139 F.3d 1009 (Fed. Cir. 1998), quoting, *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994).

B. THE CLAIMED INVENTION

Independent Claims 1 and 21 recite, in part, an unstriated dried pet food having density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3. This unstriated product (versus striated) of the present invention, which stems from turbulent rather than laminar flow extrusion, results in a dried pet food having a cellular structure that includes microscopic air pockets. See, specification, page 8, lines 17-24. Because of the microscopic air pockets of this unstriated dried pet food, the inner surface will have a fine, sandpaper-like appearance and a dense, foam-like structure that is in contrast to a laminar-like structure. See, specification, page 8, lines 25-30. This cellular structure improves the tartar reducing properties of the product by applying a mechanical scraping action to the teeth. See, specification, page 8 line 30 to page 9 line 15.

Independent Claims 7, 13, 18, 20, 25, 28 and 31 recite, in part, a dried pet food having a thickness of at least 12 mm, a length being greater than the thickness wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3.

C. THE REJECTION OF CLAIMS 7-12, 18, 20, 25, 27, 28 AND 30-33 UNDER 35 U.S.C. §102(B) SHOULD BE REVERSED BECAUSE THE CITED REFERENCE DOES NOT ANTICIPATE THE CLAIMED INVENTION

1. The Cited Reference

The Examiner alleges that *Collings* discloses every element of the present claims. Independent Claims 7, 18, 20, 25, 28 and 31 recite, in part, a pet food having a thickness of at

least 12 mm, a length being greater than the thickness wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3. In contrast, Appellants respectfully submit that *Collings* fails to disclose or suggest every element of independent Claims 7, 18, 20, 25, 28 and 31.

2. *Collings* fails to disclose or suggest each and every element of independent Claims 7, 18, 20, 25, 28 and 31

Collings fails to disclose or suggest a pet food having a thickness of at least 12 mm where the length is greater than the thickness as required, in part, by the independent Claims stated above. Rather, *Collings* discloses a moist extrudate with length 50.1 mm, width 25 mm and depth 9 mm where the extrudate is further cut into 10 mm thick chips. See, *Collings*, page 6, lines 1-4. Though it is arguable that either the 9 mm depth or 10 mm thickness is equivalent to the "thickness" discussed in Appellants' claims, both values are still lower than 12 mm. On the other hand, the 25 mm width is consistently referred to as "width", as opposed to the 50.1 mm "length" cut down to a 10 mm "thickness". The Examiner states the same. See, Office Action dated 5/5/06, page 3. Moreover, the 9 and 10 mm values are measured while the extrudate is at 18% moisture, before drying to 8.8%. See, *Collings*, page 6, lines 3-6. Therefore, it is entirely reasonable that the disclosed 9 and 10 mm values will further decrease upon standard drying. Additionally, assuming that the 10 mm thick chips represent the product's thickness and the 25 mm width represent the product's width, *Collings* discloses a length of 9 mm and a thickness of 10 mm, with the thickness greater that the length, which is in contrast to that required, in part, by Appellants' claimed invention.

The Examiner previously argued that *Collings'* reference to "50.1 mm in length, 25 mm in width" may reasonably be interpreted as a thickness of at least 12 mm where the length is greater than the thickness as required, in part, by Appellants' claims. See, Office Action dated 5/5/06, page 3. However, these measurements are in reference to a moist extrudate, rather than a dried pet food as required by Appellants' claims. After this moist extrudate exits the die, it is further cut down to 10 mm and dried. See, *Collings*, page 6, lines 1-9. Consequently, any measurements of the moist extrudate before drying into a dried pet food as proof of anticipation cannot be persuasive as it is not in finished product form.

Further, *Collings* fails to disclose or suggest the dried pet food having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 as required, in part, by the independent claims stated above. For example, *Collings* discloses a dried pet food packaged in a sealed, air tight, 5" diameter x 8" tall (5 inch x 8 inch) cardboard cylinder canister weighing 500 grams (1.102 lbs) when filled with the dried pet food. See, *Collings*, page 6, lines 10-11. After performing the proper unit conversions, shown immediately below, the calculated density of this dried pet food equals 12.123 lbs/ft^3, which is well below the presently claimed range of pet food density.

Density = Mass/Volume

Mass = 500 grams = 0.5 kg * (2.204 lbs/kg) = 1.102 lbs

Volume = π * (radius)^2 * height

radius = diameter/2 = 2.5 inches * (1 ft/12 inches) = (2.5/12) ft

height = 8 inches * (1 ft/12 inches) = (2/3) ft.

Volume = π * (2.5/12)^2 ft^2 * (2/3) ft

Density = 1.102 lbs / (π * (2.5/12)^2 ft^2 * (2/3) ft) = **12.123 lbs/ft^3**

Indeed, *Collings* is unconcerned with the density and size of the pet food product to provide a resultant product that can remove more plaque and tartar build-up than similar pet food products. In fact, *Collings* is directed entirely toward an expanded pet food product having improved resistance to breaking, which teaches away from the presently claimed invention. See, *Collings*, page 2, line 52 and page 5, lines 7-9.

The Examiner states that in providing the previous calculations, Appellants used measurements from the package containing the product of *Collings* and not from the product itself. The Examiner further states that the package contains air space that would be expected to lessen the density of the product. Nevertheless, Appellants respectfully submit that the calculations were based on reasonable assumptions regarding the overall product and packaging. For example, although the calculations did not consider the possible air space between the pet food product (which could decrease the density), the calculations balanced this by leaving out the thickness and mass of the package itself in determining the total volume and mass (which could increase the density). As a result, Appellants' previous density calculations reflected an approximate estimate of the density of the pet food product in *Collings*.

Appellants also previously submitted a supplemental Affidavit under 37 C.F.R. §1.132 ("*Supplemental Affidavit*" attached hereto as Exhibit E). This *Supplemental Affidavit* was submitted to show that by using reasonable estimations for the product packaging and filling of the pet food in *Collings*, the skilled artisan has a sufficient basis for determining the density of *Collings'* pet food product. As such, Appellants respectfully assert that the *Supplemental Affidavit* properly evidences the deficiencies of *Collings* with respect to the present claims.

As supported by the *Supplemental Affidavit*, *Collings* only discloses a pet food having a density at or below 12 lbs/ft^3. As a result, *Collings* fails to disclose or suggest a pet food product having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3. *Collings* is also unconcerned with the density and size of the pet food product to provide a resultant product that can clean teeth by removing more plaque and tartar build-up than similar pet food products in accordance with the present invention. Instead, *Collings* is directed entirely toward an expanded pet food product similar to a low density puff product that tends to melt in the mouth, which teaches away from the presently claimed invention and also supports the contention that the food product has a density markedly less than that of Appellants' invention. See, *Collings*, page 2, line 52 and page 5, lines 7-9. Such a product is incapable of having a density that is abrasive enough to clean teeth in accordance with the present claims.

Collings also fails to disclose or suggest additional elements of the present claims. For example, *Collings* fails to disclose a dried pet food product comprising at least 25% by weight of a kibble having an unstriated appearance as required, in part, by independent Claim 18.

Regarding independent Claims 25 and 28, *Collings* fails to disclose a method for making a dry pet food comprising extruding through a non-laminar flow. As stated in the specification, because Appellants' product is formulated in an extrusion process that is non-laminar, the resulting product is not striated. See, specification, page 8, lines 17-23. Based on this correlation between non-laminar flow and unstriated extrudate and because *Collings* does not disclose any flow type, one of ordinary skill in the art can reasonably conclude that because the product in *Collings* is striated, it results from laminar flow extrusion process.

Lastly, regarding independent Claim 31, *Collings* fails to disclose a dried pet food having an inner cellular structure that is characterized by a number of microscopic air pockets. As stated in the specification, the microscopic air pockets are apparent based on the fine sandpaper like appearance that should be contrasted with a laminar-like structure. See, specification, page

8, lines 24-30. Moreover, the inner cellular structure of microscopic air pockets are a characteristic of a product formulated in an extrusion process having a non-laminar flow. See, specification, page 8, lines 17-24. Therefore, because of the correlation between non-laminar flow and resulting microscopic air pockets in the product, and in light of the argument set forth in the above section regarding the flow-type in *Colllings,* one of ordinary skill in the art can reasonably conclude that because the striated product in *Collings* is results from a laminar flow extrusion process, the finished product in *Collings* lacks an inner cellular structure of microscopic air pockets.

2. *Collings* fails to disclose or suggest an "unstriated appearance" recited in independent Claims 7, 18, 20 and 25

Contrary to a previous argument made without deceptive intent, and based upon further detailed investigation of the cited art, it was discovered that *Collings* further failed to disclose a dried pet food having an unstriated appearance as required, in part, by independent Claims 7, 18, 20 and 25. In contrast, *Collings* only discloses a product having a striated appearance. In actuality, *Collings* uses process steps significantly similar to those disclosed in *Hand*, a previously copending patent application (cited in *Collings* as US Serial No. 07/899,534) cited to the obviousness rejection discussed in detail below in section D. Specifically, *Hand* discloses a pet food product having an expanded striated structural matrix. See, *Hand,* Abstract and column 2, lines 25-30. *Collings* discloses the similarity in processes by first stating that the *Hand* process, in its entirety, was insufficient to practice the advantages sought, namely a product of sufficient structural integrity to withstand breakage due to drop impact. See, *Collings,* page 2, lines 19-37. However, *Collings* adapts the process post-extrusion and not during the pre-conditioning and extrusion process, where striation formation occurs. For example, both references use identical Figures to describe the pre-conditioning and extrusion process. Compare, *Collings,* Figure 1 with *Hand,* Figure 1. Indeed, the only unique element between the Figures is element 23, a spacer ring used in *Collings* to produce a more even plasticized mass by dampening the effects of the twin-screws in the extruder. See, *Collings,* page 4, lines 40-43. Beyond that element, which has no stated role in removing striations, the apparatus in both references are identical. Therefore, since *Hand* discloses a striated finished product, *Collings* must similarly disclose a striated finished product.

As far as process parameters and beside the use of identical figures to illustrate the pre-conditioning and extrusion process, the obvious similarity is illustrated with the following example list of identical steps between the references:

a. Conditioned mix is mixed and extruded under conditions of elevated temperature, e.g. 100° to 250°F and pressure, e.g. about 100 to 1000 psi through a shaped die or nozzle. *Collings*, page 3, lines 47-49 and *Hand*, column 5, lines 55-59.

b. In the pre-conditioner, the ingredient mix is subject to steam and moisture to adjust the mix's moisture content to between 15 and 30% by weight. *Collings,* page 3, lines 44-46 and *Hand,* column 5, lines 52-55.

c. The moisture content of the final product is reduced to about 6 to 10% by weight. *Collings,* page 4, lines 2-3 and *Hand,* column 4, lines 55-57.

For at least the reasons discussed above, the cited reference fails to teach, suggest, or even disclose every element of independent Claims 7, 18, 20, 25, 28 and 31 and Claims 8-12, 27, 30 and 32-33 that depend from independent Claims 7, 18, 20, 25, 28 and 31, and thus, fails to anticipate the present claims. Accordingly, Appellants respectfully request that the rejection Claims 7-12, 18, 20, 25, 27, 28 and 30-33 be reconsidered and withdrawn.

D. THE REJECTION OF CLAIMS 1-6, 13-17, 19, 21-24, 26 AND 29 UNDER 35 U.S.C. §103(A) SHOULD BE REVERSED BECAUSE THE CITED REFERENCES ARE NOT COMBINABLE AND EVEN IF COMBINABLE, FAIL TO DISCLOSE OR SUGGEST ALL THE ELEMENTS OF THE CLAIMS

1. The Cited References

The Examiner in the Final Office Action dated May 5, 2006 alleges that *Collings* in view of *Hand* render obvious Claims 1-6, 13-17, 19, 21-24, 26 and 29. Appellants respectfully submit that the cited references are not combinable and, even if combinable, fail to disclose each and every element of independent Claims 1, 13, 18, 21, 25 and 28.

2. The cited references teach away from one another and are directed to different objectives than the present invention

Appellants respectfully submit that there is no suggestion or motivation to combine the cited references to obtain the present claims. *Collings* states that when attempting to adapt the composition and process conditions of *Hand* (SN 07/889,534 at the time of filing *Collings*) to the manufacture of a dog treat food product, it was determined that the extruded product lacked the sufficient structural integrity to withstand the impacting internal pressure when the container holding the packaged dog treat product was dropped during handling and use. See, *Collings,* page 2, lines 30-35. Moreover, drop tests performed on this extruded dog treat product resulted in unacceptable breakage rates and prompted the invention in *Collings,* directed to a process for manufacture of a dog treat product with strong structural integrity and resistance to breaking. See, *Collings,* page 2, lines 36-44. The process of *Collings* specifically diverges from the initial *Hand* process by implementing wholly different post-extrusion processing steps based upon drying the extruded dog food products using, for example, different process parameters and equipment to acquire the structural integrity not accomplished using the *Hand* process. See, *Collings*, page 4, lines 1 – 26. Therefore, one of ordinary skill in the art should conclude that, in light of the preceding, *Collings* teaches away from the complete process in *Hand* as insufficient to meet the needs disclosed in *Collings.* Moreover, both cited references are directed to completely different objectives. While *Collings* is directed to manufacturing a dog treat product with strong structural integrity and resistance to breakage within packaging, *Hand* is directed to a pet food product that exhibits improved mechanical tooth cleansing function. Thus, while *Collings* is directed to transportation and distribution needs, *Hand* is directed to product functionality in a user's oral cavity.

Note that while the cited references do indeed teach away from each other, as described in this section, the teaching away argument applies to the whole process, which is a combination of pre-conditioning, extrusion and post-extrusion steps, the location at which both processes diverge and cause functionally different finished products with completely different objectives. Contrast this to the next argument, where the cited references both disclose a product with a striated appearance, illustrated by the similarity in only a portion of the complete process, namely pre-conditioning and extrusion, where striations are formed, and not post-extrusion steps.

3. The cited references fail to disclose or suggest every element of independent Claims 1, 13, 18, 21, 25 and 28

As argued earlier, contrary to a previous argument made without deceptive intent, and based upon further detailed investigation of the cited art, it was discovered that both references failed to disclose or suggest a dried pet food having an unstriated appearance as required, in part, by independent Claims 1, 18, 21 and 25. In contrast, both references disclose products having a striated appearance. Specifically, *Hand* discloses a pet food product having an expanded striated structural matrix. See, *Hand,* Abstract and column 2, lines 25-30. Similarly, portions of the process in *Collings* are significantly similar to that disclosed in *Hand*, cited in *Collings* as previously copending patent application US Serial No. 07/899,534. *Collings* discloses the similarity in processes by first stating that the *Hand* process, in its entirety, was insufficient to practice the advantages sought, namely a product of sufficient structural integrity to withstand breakage due to drop impact. See, *Collings,* page 2, lines 19-37. However, *Collings* adapts the process post-extrusion and not during the pre-conditioning and extrusion process, where striation formation occurs. For example, both references use identical Figures to describe the pre-conditioning and extrusion process. Compare, *Collings,* Figure 1 with *Hand,* Figure 1. Indeed, the only unique element between the Figures is element 23, a spacer ring used in *Collings* to produce a more even plasticized mass by dampening the effects of the twin-screws in the extruder. See, *Collings,* page 4, lines 40-43. Beyond that element, which has no stated role in removing striations, the apparatus in both references are identical. Therefore, since *Hand* discloses a striated finished product, *Collings* must similarly disclose a striated finished product.

As far as process parameters and beside the use of identical figures to illustrate the pre-conditioning and extrusion process, the obvious similarity is illustrated with the following example list of identical steps between the references:

a. Conditioned mix is mixed and extruded under conditions of elevated temperature, e.g. 100° to 250°F and pressure, e.g. about 100 to 1000 psi through a shaped die or nozzle. *Collings*, page 3, lines 47-49 and *Hand*, column 5, lines 55-59.

b. In the pre-conditioner, the ingredient mix is subject to steam and moisture to adjust the mix's moisture content to between 15 and 30% by weight. *Collings,* page 3, lines 44-46 and *Hand,* column 5, lines 52-55.

c. The moisture content of the final product is reduced to about 6 to 10% by weight. *Collings,* page 4, lines 2-3 and *Hand,* column 4, lines 55-57.

In addition, the cited references fail to disclose or suggest a number of additional elements of independent Claims 18, 21, 25 and 28. For example, the cited references fail to disclose a dried pet food product comprising at least 25% by weight of a kibble having an unstriated appearance, as required, in part, by independent Claim 18. By contrast, as stated in the previous section, *Collings* and *Hand* disclose a product having a striated appearance.

The cited references fail to disclose a pet food comprising at least two different sized kibbles including a first sized kibble and a second sized kibble wherein the first sized kibble is larger in size than the second sized kibble, wherein the first sized kibble and the second sized kibble are present in a ratio of approximately 20 to about 80% to approximately 80 to about 20% as required, in part, by independent Claim 21. For example, *Hand* discloses a finished product where a uniform extruded strand is cut into thick disc-shaped pellets of the same length. See, *Hand,* column 8, lines 12-17. Similarly, *Collings* discloses a uniform extruded strand cut into equally thick wavy-shaped chips. See, *Collings,* page 6, lines 1-4.

The cited references further fail to disclose a method for making a dry pet food comprising extruding through a non-laminar flow, as required in part by independent Claims 25 and 28. For example, *Hand* discloses the use of laminar flow as compared to turbulent flow to achieve the objectives of improved mechanical tooth cleansing. See, *Hand,* column 3, lines 35-55. Moreover, as stated in the specification, because Appellants' product is formulated in an extrusion process that is non-laminar, the resulting product is not striated. See, specification, page 8, lines 17-23. Based on the disclosure in *Hand* and the correlation between non-laminar flow and unstriated extrudate, one of ordinary skill in the art can reasonably conclude that because the product in *Collings* is striated, it results from laminar flow extrusion process.

For at least the reasons discussed above, the cited references fail to render the claimed subject matter obvious. Accordingly, Appellants respectfully request that the obviousness rejection with respect to Claims 1-6, 13-17, 19, 21-24, 26 and 29 be reconsidered and the rejection be withdrawn.

VIII. CONCLUSION

Appellants respectfully submit that the Examiner has failed to establish anticipation under 35 U.S.C. §102 with respect to the rejections of Claims 7-12, 18, 20, 25, 27-28 and 30-33 and a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to the rejection of Claims 1-6, 13-17, 19, 21-24, 26 and 29. Accordingly, Appellants respectfully submit that the anticipation and obviousness rejections are erroneous in law and in fact and should therefore be reversed by this Board.

The Director is authorized to charge $620 for the Appeal Brief and petition for one month extension of time and any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 115808-330 on the account statement.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY _____
Robert M. Barrett
Reg. No. 30,142
Customer No. 29157

Dated: December 5, 2006

CLAIMS APPENDIX

PENDING CLAIMS ON APPEAL OF

U.S. PATENT APPLICATION SERIAL NO. 10/037,941

1. A dried pet food comprising a matrix comprising a protein source, a carbohydrate source, insoluble fiber and the dried pet food having an unstriated appearance and comprising a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm, the length being greater than the thickness wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3.

2. The dried pet food of Claim 1 wherein the protein source comprises denatured protein.

3. The dried pet food of Claim 1 wherein the carbohydrate source comprises gelatinized carbohydrate.

4. The dried pet food of Claim 1 wherein the insoluble fiber comprises approximately 2% to about 15% by weight of the matrix.

5. The dried pet food of Claim 1 wherein the insoluble fiber is a cellulose fiber.

6. The dried pet food of Claim 1 wherein the product does not include a humectant.

7. A dried pet food comprising a matrix comprising a protein source, a carbohydrate source, an insoluble fiber and the dried pet food having an unstriated appearance and a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dried pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

8. The dried pet food of Claim 7 wherein the protein source comprises denatured protein.

9. The dried pet food of Claim 7 wherein the carbohydrate source comprises gelatinized carbohydrate.

10. The dried pet food of Claim 7 wherein the insoluble fiber comprises approximately 2% to about 15% by weight of the matrix.

11. The dried pet food of Claim 7 wherein the insoluble fiber is a cellulose fiber.

12. The dried pet food of Claim 7 wherein the product does not include a humectant.

13. A dried pet food comprising a matrix comprising a protein source, a carbohydrate source, insoluble fiber, a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 and the dried pet food comprising a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm, wherein the length is greater than the thickness.

14. The dried pet food of Claim 13 wherein the protein source comprises denatured protein.

15. The dried pet food of Claim 13 wherein the carbohydrate source comprises gelatinized carbohydrate.

16. The dried pet food of Claim 13 wherein the insoluble fiber comprises approximately 2% to about 15% by weight of the matrix.

17. The dried pet food of Claim 13 wherein the product does not include a humectant.

18. A dried pet food comprising at least 25% by weight of a kibble having an unstriated appearance and comprising a matrix having a protein source, carbohydrate source, insoluble fiber, and a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dried pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

19. The dried pet food of Claim 18 wherein the matrix has a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm.

20. A method of reducing calculus and plaque build-up on a pet's teeth comprising the steps of feeding a dried pet food to a pet; and chewing by the pet on the dried pet food having an unstriated appearance and comprising a matrix including a protein source, a carbohydrate source, insoluble fiber, and having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dried pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

21. A pet food comprising at least two different sized kibbles including a first sized kibble and a second sized kibble wherein the first sized kibble is larger in size than the second sized kibble, wherein the first sized kibble and the second sized kibble are present in a ratio of approximately 20 to about 80% to approximately 80 to about 20%, and at least one kibble having an unstriated appearance and a density that ranges from about 16.8 lbs/ft^3 to about 20 lb/ft^3.

22. The pet food of Claim 21 wherein at least one of the sized kibbles has a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm.

23. The pet food of Claim 21 wherein at least one of the sized kibbles does not include a humectant.

24. The pet food of Claim 21 wherein the ratio of large to small kibbles is 20 to 50 by number percent.

25. A method for making a dry pet food comprising the steps of extruding through a non-laminar flow a protein source, carbohydrate source, and an insoluble fiber source to create a dry pet food having an unstriated appearance and having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dry pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

26. The method of Claim 25 wherein the kibble has a length of at least 15 mm, a width of at least 13.5 mm and a thickness of at least 12 mm.

27. The method of Claim 25 wherein the insoluble fiber comprises approximately 2% to about 15% by weight of the matrix.

28. A dried pet food comprising a protein source, a carbohydrate source, an insoluble fiber source and having an inner cellular structure that is created by a non laminar flow extrusion process wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dried pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

29. The dried pet food of Claim 28 further comprises at least one kibble that has a length of at least 15 mm, a width of at least 13.5 mm, and a thickness of at least 12 mm.

30. The dried pet food of Claim 28 further comprises at least one kibble that does not include a humectant.

31. A dried pet food comprising a protein source, a carbohydrate source, an insoluble fiber source and having an inner cellular structure that is characterized by a number of microscopic air pockets wherein the dried pet food has a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3, wherein the dried pet food comprises a thickness of at least 12 mm and a length that is greater than the thickness.

32. The dried pet food of Claim 31 wherein the interior includes circular pores.

33. The dried pet food of Claim 31 wherein the interior has a sponge-like structure.

EVIDENCE APPENDIX

EXHIBIT A: Office Action dated May 5, 2006

EXHIBIT B: Advisory Action dated August 24, 2006

EXHIBIT C: EP 0645095 to Collings et al (*"Collings"*), cited by the Examiner in the Office Action dated May 5, 2006

EXHIBIT D: U.S. Patent No. 5,431,927 to Hand et al (*"Hand"*), cited by the Examiner in the Office Action dated May 5, 2006

EXHIBIT E Supplemental Affidavit submitted under 37 C.F.R. §1.132 (*"Supplemental Affidavit"*) dated August 1, 2006

RELATED PROCEEDINGS APPENDIX

None

EXHIBIT A

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/037,941	01/03/2002	Carolyn Jean Cupp	112701-330	7917

29157 7590 05/05/2006

BELL, BOYD & LLOYD LLC
P. O. BOX 1135
CHICAGO, IL 60690-1135

EXAMINER	
HENDRICKS, KEITH D	

ART UNIT	PAPER NUMBER
1761	

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/037,941	CUPP ET AL.	
	Examiner	Art Unit	
	Keith Hendricks	1761	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 01, 2006, has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 7-12, 18, 20, 25, 27, 28, and 30-33 remain rejected under 35 U.S.C. 102(b) as being anticipated by Collings et al. (EP 0 645 095). The reference and rejection are incorporated as cited in a previous Office action.

Applicant's arguments filed February 01, 2006, have been fully considered but they are not persuasive. Applicant's 1.132 declaration has been considered but is not deemed persuasive, as the rejection is maintained for the reasons of record.

At pg. 2 of the Feb 2006 response, applicant states that the density of Collings differs from that of the instant claims, namely that the product of Collings allegedly has a density of 12.123 lbs/ft^3, whereas the instantly claimed product has a density of about 16.8 to about 20 lbs/ft^3. However, it is noted that in providing the calculations, applicant used measurements from the *package containing the product* of Collings, and not from the product itself. Thus this contains air space which would be expected to lessen the density of such an article. Applicant has provided no convincing evidence or argument on the record which provides an accurate comparison of the prior art product with that of the instant claims. As such, the rejection is maintained for the reasons of record.

Applicant also submits arguments regarding the measurement properties of the Collings product which were previously submitted and addressed on the record. These are not new arguments and are not deemed persuasive, as previously addressed. Again, regarding the issue of "a thickness of at least 12 mm and a length that is greater than the thickness", it is noted that no third dimension is provided in the claims, either in a relative proportion or as a specific amount. This is important to note because given only two dimensions, "length" and "thickness" (or depth), these may be interpreted in multiple ways, depending on the viewed perspective of the dried pet food. In one view, one may perceive a thickness/depth, but turned on its side, what was previously the "thickness" may now be its width. The longest dimension would always be the length, while the other two dimensions would be open to interpretation with regard to perspective of width or depth/thickness. As previously stated on the record, Collings et al. state that "the extruded strand swells upon exiting the die due to flashing of moisture to steam producing an expanded structure. The strand is cut into 46 to 55 mm lengths of pieces or chips" (pg. 5, ln. 8-10) and is then further dried. The top of page 6 of the reference states that the extrudate was produced "in the form of an expanded strand 50.1 mm in length, 25 mm in width and 9 mm in depth. The strand product swelled upon issuing from the die... [and] was cut into 10 mm thick wavy-shaped chips." Given the scenario described above, however, without the recitation of a measurement for all three dimensions, the referenced teaching of "50.1 mm in length, 25 mm in width" may reasonably be interpreted as having "a thickness of at least 12 mm and a length that is greater than the thickness", wherein the width is viewed as the thickness.

Applicant again states that "Collings is unconcerned with the density and size of the pet food product to provide a resultant product that can remove more plaque and tartar build-up than similar pet food products" (pg. 2, response). This is not deemed persuasive for the reasons of record. Applicant appears to be stating that, although the product of Collings et al. provides improved resistance to breakage on shipping and handling, this would somehow not translate to improved resistance to breaking upon chewing by a pet. This is not a logical conclusion, and has no basis within the reference or the state of the art at the time the invention was made. Applicant has suggested "improved dental cleaning properties" in their arguments, yet this is not found in the instant claims. In fact, however, applicant's own specification, at the top of page 9, states that "being of a low density, the foam [i.e. claimed product] absorbs tooth pressure without splintering and/or crumbing during the chewing process." Thus, regardless of the source of the external pressure applied to the product, be it a shipping package material

or a pet's teeth, the same properties (a) are present and inherent, and (b) would be the result of the same components and overall structure within both the claimed and referenced products.

Thus and again, although the reference does not specifically disclose every possible quantification or characteristic of its product, including density data, the density of the product would have been within the instantly-claimed range of "about 16.8 lbs/ft^3 to about 20 lbs/ft^3", absent any clear and convincing evidence and/or arguments to the contrary. The reference discloses the same starting materials and methods as instantly (both broadly and more specifically) claimed, and thus one of ordinary skill in the art would recognize that the product density, among many other characteristics of the referenced product, would have been an inherent result of the product disclosed therein. Similarly, regarding instant claims 28 and 31-33, the resultant texture of the extruded product would also have been an inherent result of the disclosed product, based upon the same starting materials and methods of production. Furthermore, at page 5 the reference states that the "plasticized food" component "swells upon exiting the die due to flashing of moisture to steam producing an expanded structure" (lines 8-9). This process is similar to that found in the production of cheese puffs, which also expand upon exiting the heated extruder through a constrictive exit passageway, and also contain pockets of air and circular pores as a result of this process. The Patent Office does not possess the facilities to make and test the referenced product, and as a reasonable reading of the teachings of the reference has been applied and does anticipate the instant claims, the burden thus shifts to applicant to demonstrate otherwise.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-6, 13-17, 19, 21-24, 26 and 29 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Collings et al., in view of Hand et al. (US PAT 5,431,927). The references and rejection are incorporated as cited in a previous Office action.

Applicant's arguments filed February 01, 2006, have been fully considered but they are not persuasive.

At page 3 of the response, applicant states that one would not have been motivated to combine the teachings of Collings et al. and Hand et al., because Collings et al. is directed to an unstriated product, while Hand et al. is directed to a striated product. Applicant alleges that this somehow presents a teaching away from the primary reference, and alleges that the July 30, 2004 Office action admits such. This is not persuasive for the reasons of record. Applicant's allegation that the PTO admitted that there was a "teaching away" is inaccurate and erroneous. At no point did the Office "admit that Hand and Collings relate to different types of pet foods," as stated in applicant's previous response, nor did the examiner admit to a "teaching away." Page 4 of the July 30, 2004 Office action specifically stated that "Hand et al. provides a similar pet food product" to that of Collings et al. Applicant has provided no basis for their statements. The Office actions have continued to clearly indicate (a) a positive teaching toward the motivation to combine, and (b) that there is no such "teaching away." Applicant's continued pursuit of this misdirected notion does not serve to clarify the record or further prosecution.

Applicant states that Hand teaches away from Collings, due to the striated appearance of the product of Hand. Applicant is referred to the Final Office action of September 02, 2005, where this has already been addressed. It is noted that the primary reference, Collings et al., teaches an unstriated product, just as instantly claimed. The 1.132 declaration addresses the products of the references with regard to un/striated appearance and method of producing, yet this was already known and appreciated on the record. It does not serve to present any new and/or unexpected properties of the claimed invention, nor does it serve to overcome the proper rejections of record.

The Hand reference was provided to demonstrate that other similar pet food products were well known in the art, and were produced having the same dimensions as instantly claimed. Given this, it would have been obvious to one of ordinary skill in the art to have provided the pet food product of Collings et al. having the instantly claimed dimensions, absent any clear and convincing evidence and/or arguments to the contrary. Applicant has not demonstrated a patentable distinction or criticality to the extra 2mm in thickness (any difference between 10mm and 12mm). It is noted that this would not be expected to relate to the "improved dental cleaning properties" as applicant alleges, nor would it materially affect the density of the product.

Finally, reference is made to MPEP 2144.04 IV (a), which states:

> Changes in Size/Proportion
>
> *In re Rose* , 220 F.2d 459, 105 USPQ 237 (CCPA 1955) (Claims directed to a lumber package "of appreciable size and weight requiring handling by a lift truck" were held unpatentable over prior art lumber packages which could be lifted by hand because limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art.)

In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Conclusion

This is an RCE of applicant's earlier application of the same serial number. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Hendricks whose telephone number is (571) 272-1401. The examiner can normally be reached on M-F (8:30am-6pm); First Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton Cano can be reached on (571) 272-1398. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KEITH HENDRICKS
PRIMARY EXAMINER

EXHIBIT B

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/037,941	01/03/2002	Carolyn Jean Cupp	112701-330	7917

29157 7590 08/24/2006

BELL, BOYD & LLOYD LLC
P. O. BOX 1135
CHICAGO, IL 60690-1135

EXAMINER	
HENDRICKS, KEITH D	

ART UNIT	PAPER NUMBER
1761	

DATE MAILED: 08/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Advisory Action Before the Filing of an Appeal Brief

Application No.	Applicant(s)	
10/037,941	CUPP ET AL.	
Examiner	**Art Unit**	
Keith Hendricks	1761	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 04 August 2006 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: _____.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☒ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: see attached sheet.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). _____
13. ☐ Other: _____.

10/037,941

Attachment to Advisory Action

102 rejection:

Applicant's arguments have been considered, but are not deemed persuasive over those already presented, which claims were and are rejected over the prior art for the reasons of record.
The submission of a second affidavit, directed to the same issue that has repeatedly been on the record, is not considered timely, and will not be entered or considered at this point in prosecution. Applicant has had ample time and opportunity to address these issues, including in previous (RCE) filings. Further, it is noted that such information would not be proper as part of an appeal brief without prior consideration.

103 rejection:

Applicant's arguments submitted in the response of August 04, 2006, have been considered. The arguments are not deemed persuasive over those already presented, which claims were and are rejected over the prior art for the reasons of record.

At the top of page 5 of the response, applicant states that "The Patent Office is essentially arguing that the skilled artisan would take a striated pet food and make it unstriated." This is an absolutely incorrect and misleading representation of the rejection, which has been clearly set forth by the Office actions on the record. This interpretation of the rejection is wholly inaccurate, and does not serve to further prosecution, reduce the issues at hand, nor does it serve to actually address the issues as set forth in the previous Office actions.

In response to applicant's argument that the teachings of Hand et al. would "destroy" the invention of Collings et al., the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Contrary to applicant's statements, the Office is in no way suggesting that "the skilled artisan would take a striated pet food and make it unstriated," as applicant incorrectly purports. Rather, the rejection set forth in the first Office action of July 2003 (see specifically pages 4-5) stated that the product of Collings et al. differed from the claimed invention in size dimensions only, and that one of ordinary skill in the art would have been able to readily select a pet food product of similar size. As stated therein, "it would not have involved an inventive step for one of ordinary skill in the art to have cut and produced the final pet food in slightly larger dimensions, as shown by the similar and related products of Hand et al. There does not appear to be a patentable distinction between the slightly larger dimensions as a matter of 2-4 mm of the pet food product." Thus Hand et al. was included as a general reference showing that pet food products were known to be produced within the size ranges instantly claimed. Therefore applicant's statement that the "Office is essentially arguing that the skilled artisan would take a striated pet food and make it unstriated" is completely unfounded. Further and again, this does not address the actual issues and motivation set forth of record.

Finally, applicant is again referred to MPEP 2144.04 (IV) (a), regarding nominal changes in size and shape of a known product.

Applicant has not successfully met the burden of accurately addressing and overcoming the rejections of record, and thus the rejections stand.

KEITH HENDRICKS
PRIMARY EXAMINER

EXHIBIT C

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(54) Extruded dog treat food product having improved resistance to breakage.

(57) A dog treat food product is disclosed which is extruded from a nutritionally balanced mixture of carbohydrate, protein, fat, vitamins and minerals. The dog treat food product exhibits improved resistance to breakage on impact by drying pieces of the extrudate under controlled conditions of humidity to a moisture level of between 6-10% by weight at a relative humidity of about 5 to about 25%, a dry bulb temperature of about 150 to about 250°F, a wet bulb temperature of about 105 to about 150°F and for at least 15 minutes.

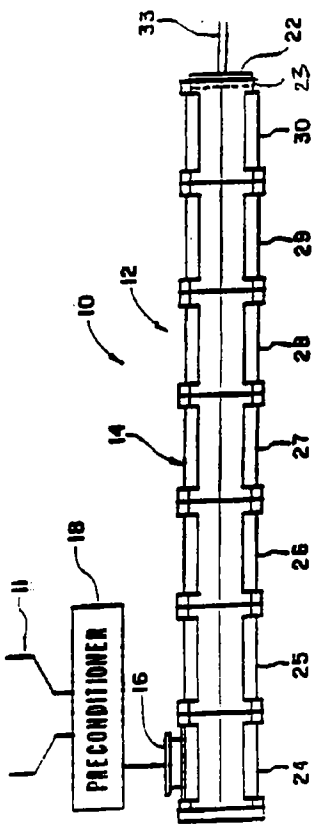


FIG. 1

EP 0 645 095 A1

BACKGROUND OF THE INVENTION

FIELD OF INVENTION

This invention relates to an extruded dog food product and in particular to an extruded dog food product having improved resistance to breakage on shipping and handling.

PRIOR ART

The nutrition and health of dogs is one of the most important aspects of pet care. Most dog owners wish to provide their dogs a well-balanced and healthy diet. As people are becoming much more aware of their own personal nutrition, there is an increased awareness in the importance of providing balanced nutrition in the form of pet food and pet treats.

Dogs should be fed a balanced diet combining water, proteins, carbohydrates, fats, minerals and vitamins. Pet owners routinely treat their dogs with a variety of snack foods made for this purpose. Many of these snack foods are not nutritionally balanced for a particular life stage. It is therefore proposed to provide a canine food product that the pet owner can give to his dog as a treat while maintaining the balance of nutrients necessary for good health.

In copending patent application US Serial No. 07/899,534 filed June 16, 1992 corresponding to EP Application No. there is disclosed an extruded animal food product having an expanded, striated structural matrix which when chewed by the animal effectively removes tartar, stain and plaque from the animal's teeth through a mechanical cleansing action. The extruded expanded food product has a low moisture content and is formed from an ingredient mixture of carbohydrate, fat, protein and fibre-bearing ingredients and nutritional balancing ingredients such as vitamins and minerals.

In preparing the pet food product of SN 07/899,534, the ingredient mixture is formed into pieces by moving the mixture under plasticizing mechanical agitation and increasing levels of temperature and shear to form a flowable mass which is advanced through a die of predetermined diameter having a coefficient of friction no greater than 0.2 to form a continuous strand of product in an expanded and stratified condition. The product when formed into pieces exhibits strong structural integrity and is not subject to breakage on handling.

When it was attempted to adapt the composition and process conditions of SN 07/889,534 to the manufacture of a dog treat food product, that is, a product that was not in a stratified condition, it was determined that the extruded, expanded dog treat product did not have sufficient structural integrity to withstand breakage due to drop impact, i.e., the product could not satisfactorily withstand the impacting internal pressure when the container in which the dog treat product was packaged was dropped during handling and use. Drop impact tests performed on the dog treat product packaged in cardboard canisters i.e., the number of broken pieces as represented as a percentage of total weight, indicated an unacceptable breakage rate, i.e. greater than 10%, and as high as 60-80%.

Therefore, there is a need in the pet food field for a nutritive, extruded dog food treat product which exhibits resistance to breakage when packaged and handled.

SUMMARY OF THE INVENTION

The present invention is directed to a process for the manufacture of an extruded dog treat food product which exhibits strong structural integrity and is resistant to breakage; wherein an ingredient mixture of carbohydrate, fat, protein, and nutritional balancing ingredients such as vitamins and minerals are extruded as a continuous strand of shaped product in an expanded condition. The strand of expanded product is segmented into discrete pieces or chips upon exit of the strand from the extruder. The pieces are then dried in moisturised heated air, and the final moisture content of the product reduced to about 6 to about 10% by weight, in an atmosphere of about 5 to 25% relative humidity, a dry bulb temperature of about 150 to about 250°F (66°C to 121°C), and a wet bulb temperature of about 105 to about 150°F (41°C to 66°C), the pieces being exposed to these drying conditions for at least 15 minutes.

The extruded food product of the present invention is a solid, uniform, expanded composition. When tested for breakage in drop impact tests, the % breakage is in the range of about 4-6%. In a preferred embodiment of the invention, fibre-bearing ingredients are included in the ingredient mixture from which the expanded dog treat food product is prepared. Extruded dog treat food products containing about 2 to about 10% by weight of fibre-bearing ingredients exhibit drop impact breakage levels of less than 3%.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The extruded expanded product of the present invention has a typical nutritional content as follows:

Ingredient	% by Weight
Carbohydrate	about 20 to about 70
Protein	about 12 to about 30
Fat	about 3 to about 20
Nutritional balancing agents (vitamins and minerals)	about 0.5 to about 5

Suitable ingredients which may be used to prepare the extruded food product of the present invention generally contain substantial amounts of animal protein derived from protein sources such as poultry by-products and whole dried eggs; fibre derived from beet pulp, soy mill run and purified cellulose; carbohydrates provided by carbohydrate sources such as cereals and grains such as wheat, corn and rice; and fats derived from fat sources such as choice white grease and vegetable oil. Small amounts of vitamins, mineral salts, flavourings, colourants and preservatives are also generally included in the food product of the present invention to provide nutritional balance and palatability. A preferred dog treat food product dried in accordance with the process of the present invention is prepared from a mixture of the following ingredients.

Ingredient	% by Weight
Corn (Ground)	40 - 70
Cellulose Fibre	2 - 10
Poultry By-Product Meal	20 - 30
White Grease	1 - 10
Inorganic Salts ((NaCl, KCl, $CaCO_3$)	0.5 - 2.0
Vitamins	0.01 - 0.2
Trace Minerals	0.01 - 0.2
Preservatives	0.01 - 0.2

In preparing the extruded, expanded dog treat product of the present invention, the mixture of ingredients selected to yield a nutritionally balanced diet is mixed and preconditioned (or moisturised within a preconditioner or mixing cylinder) wherein the ingredients are contacted with steam and moisture. The moisturised mixture is then introduced into the preconditioner of a heatable extruder having one or more helical transfer screws axially rotatable within a closed heatable barrel and equipped with a restricted extrusion discharge passageway such as a die at the front end of the barrel.

In the pre-conditioner, the mixture of ingredients is subjected to steam and moisture in order to adjust the moisture content of the mixture to between about 15 and 30% by weight. The moisture conditioned mixture is then mixed and advanced through the barrel of the extruder by the axially rotating screws which plasticise the mixture. The advancing mass builds up sufficient shear to cause the plasticized mixture to form a flowable mass to be advanced at the desired temperature, e.g., 100-250°F (38°C to 121°C), and pressure eg., 100 to 1000 psi through a shaped die mounted at the front end of the extruder barrel. The plasticising combination of temperature shear and pressure subjects the mixture to compression and temperature sufficiently high so that it is cooked or gelatinized as it advances through the extruder barrel.

As the food product of the present invention is extruded from the die, the moisture in the extrudate is in a superheated state and flashes to steam when the extrudate leaving the die has the compression suddenly relieved whereby the escaping steam swells and expands the extrudate. This extrudate exits the die in the form of a thick strand of expanded mass which is segmented into pieces or chips by rotating knives or other cutting means. The chips are then dried under carefully controlled conditions of temperature and humidity to obtain a breakage resistant product.

In preparing the final dog treat food product, the final moisture content of the expanded extrudate pieces is an important feature of the present invention. To obtain an acceptable breakage resistant product, the moisture content of the final product is adjusted to the range of about 6 to about 10%. Preferably the moisture content is reduced to about 7 to about 9% by weight. At moisture levels below 6% the product becomes extremely fragile. At moisture levels above about 10%, the risk of mould growth significantly increases.

In the step of drying the extruded food products to achieve the desired final moisture level, the relationship between the drying temperature and the length of time for the drying step, is a critical feature in the manufacture of the dog treat product of the present invention. Thus, the drying process used to obtain the final moisture level in the dog treat product requires extremely careful control of the temperature and humidity and must be done relatively slowly in order to produce a product of satisfactory breakage resistance. If the drying is carried out too quickly, i.e., at too high a temperature, e.g. above about 250°F (121°C), the dried pieces or chips of extruded product will be fragile and exhibit high breakage rates. Drying carried out too quickly, will "case harden" the extruded chips creating internal microfissures which render the product vulnerable to fragmentation along the microfissure lines.

To reduce the moisture content of the extruded chips, the chips are dried in a dryer, e.g. a hot air humidity controlled circulating oven adjusted to a relative humidity of about 5 to about 25%. Relative humidity (RH) is defined in a standard manner as the ratio of vapour pressure in the air to the saturation vapour pressure at the same temperature and is expressed as %. These conditions of relative humidity are achieved at dry bulb temperatures in the range of about 150 to about 250°F (66°C to 121°C) and wet bulb temperatures of about 105 to about 150°F (41°C to 66°C), and preferably a dry bulb temperature in the range of about 160 to about 210°F (71°C to 99°C) and a wet bulb temperature in the range of about 110 to about 130°F (43°C to 54°C).

To advantageously accomplish drying of the extruded dog treat product of the present invention at a relative humidity within the range of about 5 to about 25% and a dry bulb temperature of about 150 to 250°F and a wet bulb temperature of 105 to 150°F, the product is exposed to these drying conditions for a period of at least about 15 minutes and preferably about 20 to about 120 minutes and most preferably about 45 to about 90 minutes.

The invention may be put into practice in various ways and one specific embodiment will be described to illustrate the invention with reference to the accompanying drawing in which

FIG.1 is a schematic presentation of an extrusion system used to manufacture the dog treat food product of the present invention.

In Figure 1, there is shown one embodiment of an extrusion apparatus 10 which can be used to manufacture the extruded, expanded food product of the present invention. The extrusion apparatus 10 includes an extruder 12 having a barrel 14 with an inlet 16 located below the outlet of a preconditioner 18; the extruder 12 also having an outlet equipped with a die section 22. Hopper 11 is provided to pre-mix the ingredients prior to preconditioning. The barrel 14, as depicted, comprises seven barrel sections 24, 25, 26, 27, 28, 29, 30, although the number of barrel section may vary without departing from the principles of the present invention. The barrel sections are interconnected to present an elongated bore through the barrel 14 of the extruder 12. Two co-rotating, flighted material advancing screws (not shown) are received in the bore of the barrel and are intermeshed along the majority of the length of the extruder barrel 14 and terminate in the die section 22. The screws feed material to and through the extruder assembly, including the die 22, at an appropriate velocity. A spacer ring 23 is inserted between the terminal end of the rotating screws (not shown) and the adjacent face of the die 22. The spacer ring 23 provides a small surge area to dampen the effects of the twin screws so that the flow of plasticised mass is more even. Extrusion apparatus 10 of the type illustrated in figure 1 is available from the Wenger Manufacturing Company such as the Wenger TX52 Twin Screw Extruder. The pre-conditioner 18 shown in Figure 1 is also manufactured by Wenger Manufacturing, Inc.

In preparing the expanded, extruded dog treat product of the present invention, the ingredients from which the dog treat is extruded are first mixed in a mixer such as a ribbon mixer and fed to hopper 11. These ingredients include protein materials such as poultry by-product meal; carbohydrates such as ground yellow corn and vitamin mix and mineral mix. In a preferred embodiment a fibre bearing ingredient such as beet pulp or cellulose fibre, is included in the ingredient mixture. The mixed ingredients are metered to the preconditioner 18 and admixed with fats such as white grease which are fed directly in the preconditioner 18 at a rate between about 0.4 to 0.6 pounds/minute (lbs./min) (0.18 to 0.27 kgs/min). In the preconditioner 18, the mixture of ingredients is fed thereto at a rate between 4 and 10 lbs./min (1.8 to 4.5 kgs/min). The temperature of the mixture is raised from ambient to 120 to 212°F (49 to 100°C) by the injection of steam into the preconditioner 18 at the rate of 0.2 to 0.6 lbs./min (0.09 to 0.27 kgs/min) . Total residence time in the preconditioner 18 generally ranges from 2 to 15 minutes.

Preconditioning the mixture with steam and water initiates hydration of the carbohydrate and fibrous ingredients which is completed by the mechanical working during the extrusion process. Once the mixture of

ingredients and water is introduced into the extruder barrel 14, the mixture is advanced along the length of the barrel 14 by axial rotation of the screws. The mixture is sequentially advanced through the extruder and finally through the die 22. As the dog treat ingredient mixture passes through the barrel sections 24, 25, 26, 27, 28, 29 and 30, it is mixed and cooked. The build-up of the plasticised food ingredient mixture transferred to the die 22 by the rotating transfer screws causes pressures of about 50 to about 300 psi to be applied to the mixture at the die opening.

The extrudate strand 33 as it leaves the die 22 has a moisture content of about 15 to about 25% water by weight and preferably about 18 to about 20% water by weight. The extruded strand 33 swells upon exiting the die due to flashing of moisture to steam producing an expanded structure. The strand is cut into 46 to 55 mm lengths of pieces or chips and then placed in an oven and subjected to drying under controlled conditions of humidity e.g., about 5 to about 25% relative humidity at about 150 to about 250°F (dry bulb) and about 105 to about 150°F (wet bulb) for at least 15 minutes and generally about 20 to 120 minutes to reduce the moisture level of the chips to about 6 to about 10% moisture.

The invention is further illustrated by the following specific but non-limiting Examples.

EXAMPLES 1A, B and C

A solid nutritionally balanced dog treat food product designated Composition A (Example 1A) having an expanded structural matrix was prepared in accordance with the present invention by first mixing the following ingredients:

Ingredient	Weight%
Ground Yellow Corn	57.385
Poultry By-Product Meal	26.315
Cellulose Fibre [1]	5.000
Choice White Grease	5.700
Sodium Chloride	0.333
Dicalcium Phosphate	1.710
Potassium Chloride	0.40
Choline Chloride	0.095
Vitamin Mix	0.105
Mineral Mix	0.033
Iron Oxide	0.029
Ethoxyquin (Preservative)	0.019

[1] cellulose fibres of 60 microns average length.

The ingredients (except the choice white grease) were milled through a hammer mill having screen size of 3/64 inch (0.1 cm) and then blended in a ribbon mixer for 2-3 minutes.

The blended mixture was fed to the hopper 11, of a Wenger twin screw extruder (Model No. TX 52) equipped with a preconditioner 18. The Wenger TX 52 extruder was of the type schematically illustrated in Figure 1 and was provided with two rotatable, flighted material advancing screws and had a total of 7 barrel sections and terminated in a spacer plate die.

The mixture, having a moisture content of 14.5%, was fed to the preconditioner at a rate of 6.5 lbs/min (2.95 kgs/min). The mixture was raised in temperature to 190°F (88°C) by the injection of steam introduced at a rate of 0.6 lbs/min (0.27 kgs/min) into the preconditioner. Water was introduced into the preconditioner at the rate of 0.7 lbs/min (0.32 kgs/min). Choice white grease was added to the preconditioner at the rate of 0.4 lbs/min (0.18 kgs/min). The preconditioned mixture was fed into the inlet 16 of the extruder feeding zone. The screws of the extruder were rotated at a speed of 450 rpm.

Temperatures of the extruder barrel sections were maintained at 180°F (82°C)., 190°F (88°C)., 210°F (99°C)., 215°F (102°C) and 230°F (110°C) and 235°F (118°C) for the second, third, fourth, fifth, sixth and sev-

enth, barrel sections respectively. The die issued the extrudate in the form of an expanded strand 50.1 mm in length, 25 mm in width and 9 mm in depth. The strand product swelled upon issuing from the die due to moisture in the extrudate flashing to steam. The strand having a moisture content of 18% by weight was cut into 10mm thick wavy-shaped chips.

The chips were then conveyed to a forced air drying system and the moisture level reduced to 8.8% by weight under controlled conditions of humidity. The dryer was set to a dry bulb reading of 205°F (96°C) and a wet bulb reading of 125°F (52°C), whereby a relative humidity of 13% was maintained. The extruded product was placed on perforated trays and exposed to these conditions for 45 minutes whereby the final moisture level of 8.8% was achieved.

The dried product was packaged in a sealed, air tight, 5" diameter x 8" tall (12.7 x 20.3cm) cardboard cylindrical canisters which weighed 500 grams when filed.

After one week storage, the sealed canisters were subjected to a drop test to determine whether the dog treat product could satisfactorily withstand the impacting internal pressure when the canisters containing the dog treat chips were dropped during shipping or handling. In the drop test, 48 sealed canisters containing the dog treat chips were packaged in corrugated boxes (12 per box) and the boxes dropped from a height of three feet, three times in succession. Thereafter, the dog treat chip contents of the canisters were inspected for product damage and % breakage determined. Percent breakage was determined as the number of broken pieces represented as a percent of total weight of product in each canister. A percent breakage of below 10% was considered acceptable in the drop test.

The procedure of Example 1A was repeated with the exception that the 5% cellulose fibre content of Composition A was modified by substituting 5% beet pulp (Composition B) or 5% Soy Mill Run (Composition C) as the fibre-bearing ingredient. The results of the drop test are summarised in Table 1 below.

Table 1

Example	Composition	% Breakage	Std.Dev.
1A	A	0.78	1.3
1B	B	2.3	2.6
1C	C	2.9	2.7

The results recorded in Table 1 indicate that the drop impact breakage of the extruded expanded fibre reinforced dog treat product can be reduced to below 3% by drying the product to a moisture level below 10% at a RH of 13% and a dry bulb/wet bulb temperature of 205/125°F for 45 minutes. Packaged dog treat product reinforced with cellulose fibre exhibited the least breakage when dropped.

Examples 2A, B, C and D

The procedure of Example 1 was repeated to manufacture a dog treat product using the following ingredients:

Ingredient	Wt.%
Ground Yellow Corn	60.41
Brewers Rice	3.00
Poultry By-Product Meal	27.70
Sodium Chloride	0.35
Choice White Grease	6.00
Potassium Chloride	0.45
Dicalcium Phosphate	1.80
Choline Chloride	0.10
Vitamin Mix	0.11
Mineral Mix	0.035
Iron Oxide	0.03
Ethoxyquin	0.02

The dog treat food product was dried to moisture levels of 6.0-8.8% at varying R.H. and dry/wet bulb temperatures for varying time periods. The dried dog food treat was then subjected to drop tests of the type described in Example 1 to determine its resistance to breakage. The results are recorded in Table II below.

Table II

Example	Final Product Moisture(%)	Dry Bulb/ Wet Bulb Temp(°F)	RH(%)	Drying Time (Min.)	Breakage %	Std. Dev.
2A	8.7	160/112	25	78	3.8	2.6
2B	8.7	205/125	13	45	5.3	4.0
2C	6.0	285/115	1.1	1.7	25.0	6.4
2D	7.3	283/116	1.0	13	25.2	10.1

The results recorded in Table II show that the extruded expanded dog treat food product in which a fibre bearing ingredient is absent when dried in accordance with the process of the present invention (Examples 2A and 2B) exhibits an impact breakage of about 4 - 5% whereas the same product (Examples 2C and 2D) dried under temperature, time and RH conditions outside the scope of the present invention exhibited unacceptable (25%) breakage levels.

Claims

1. A dog treat food product containing carbohydrate, protein, fat and nutritional balancing agent ingredients which is an expanded extrudate product and has a moisture content of about 6 to about 10% by weight.

2. A method of preparing a dog treat food product which exhibits reduced physical breakage during shipping and handling which comprises working a food mixture containing carbohydrate, protein, fat and nutritional balancing agent ingredients, under mechanical pressure and heat sufficient to convert the mixture to a flowable mass, passing the mass through a die to obtain an expanded extrudate product, segmenting the extrudate into pieces and then drying the pieces to a final moisture content of about 6.0 to about 10.0% by weight.

3. A method as claimed in claim 2 in which the said drying is carried out in an atmosphere of about 5 to about 25% relative humidity, a dry bulb temperature of about 150 to about 250°F, and a wet bulb temperature of about 105 to about 150°F, the pieces being exposed to these drying conditions for a period of at least 15 minutes.

4. A method as claimed in claim 1 or claim 2 characterised in that a fibre bearing ingredient is incorporated in the dog treat product.

5. A method as claimed in claim 4 characterised in that the fibre bearing ingredient is cellulose fibre, beat pulp or soy mill run.

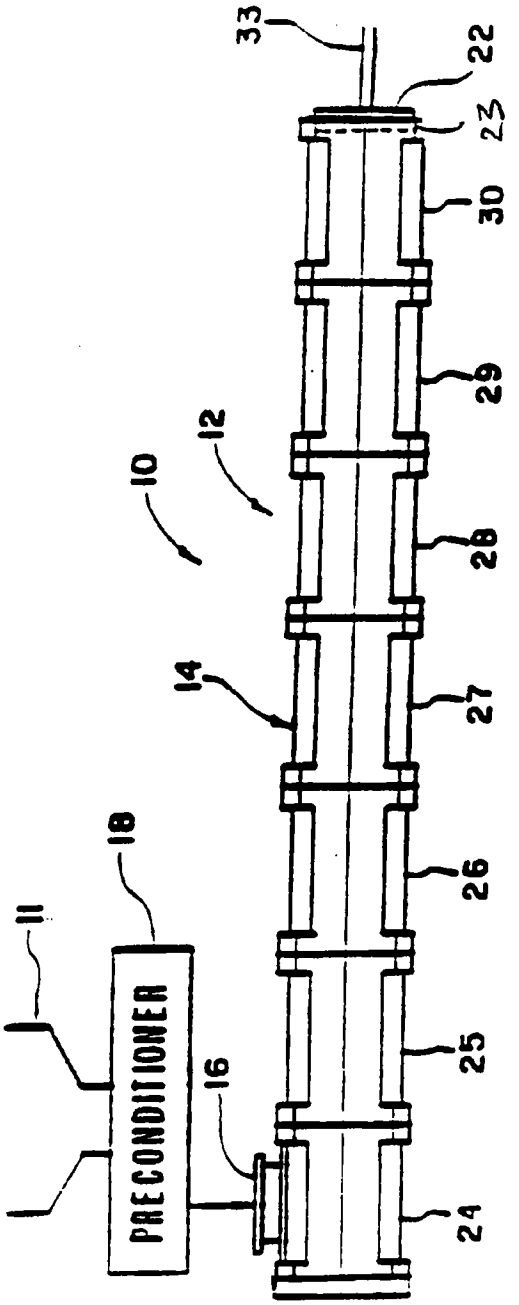
6. A method as claimed in any one of the preceding claims characterised in that the pieces are dried for about 20 to about 120 minutes.

7. A method as claimed in any one of the preceding claims characterised in that the pieces are dried to a moisture content of about 7 to about 9% by weight.

8. A method as claimed in any one of the preceding claims characterised in that the food mixture has a nutritional content of about 20 to about 70% by weight carbohydrate, about 20 to about 30% by weight protein, about 3 to about 20% by weight fat and about 0.5 to about 5% by weight nutritional balancing agents.

9. A method as claimed in any one of the preceding claims characterised in that the fibre bearing ingredient is incorporated in the food mixture at a concentration of about 2 to about 10% by weight.

FIG. 1



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 6877

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
P,X, D	EP-A-0 575 021 (COLGATE-PALMOLIVE COMPANY) * page 4, lines 29-33, page 5, lines 19-29, example, claims *	1,2,4-9	A23K1/18 A23K1/00
X	US-A-4 020 187 (MCCULLOCH ET AL.) * column 1, line 59 - column 2, line 19, examples *	1,2,4,5, 7-9	
X	DE-A-22 04 049 (RALSTON PURINA CO.) * page 3, line 3, table (page 7), examples *	1,2,4,5, 8,9	
X Y	CA-A-1 172 092 (GENERAL FOODS CORPORATION U.S.A.) * page 4, line 15 - page 5, line 7, page 22, lines 10 - 14 *	1,2,4,5, 7-9 1-9	
X Y	US-A-4 310 558 (NAHM JR.) * column 2, line 47, column 3, line 57, table III, examples *	1,2,4,5, 8,9 1-9	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A23K
X	PATENT ABSTRACTS OF JAPAN vol. 12, no. 312 (C-523) 24 August 1988 & JP-A-63 084 451 (NIPPON PET SANGYO KK) 15 April 1988 * abstract *	1,2,4,5, 7	
X	DE-A-26 04 917 (MÜLLER EDMUND) * Claim 1 *	1,2,4,5, 8,9	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	30 December 1994	Bendl, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 6877

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-4 143 169 (SKOCH ET AL.) * column 4, line 41 *	1,2,4,5, 7-9	
Y	SCHORMÜLLER JOSEF 'Lehrbuch der Lebensmittelchemie' 1974 , SPRINGER-VERLAG , BERLIN, HEIDELBERG, NEW YORK pages 279, 280: "Trocknung der Lebensmittel" * page 280, first full paragraph *	1-9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	30 December 1994	Bendl, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

EXHIBIT D

US005431927A

United States Patent [19]

Hand et al.

[11] Patent Number: 5,431,927

[45] Date of Patent: Jul. 11, 1995

[54] PET FOOD PRODUCT HAVING ORAL CARE PROPERTIES

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[51] Int. Cl.[6] **A23K 1/00**

[52] U.S. Cl. **426/2**; 426/805; 426/443; 426/448; 426/623; 426/144; 424/49

[58] Field of Search 426/72, 73, 74, 2, 144, 426/443, 448, 449, 623, 805, 802; 424/49

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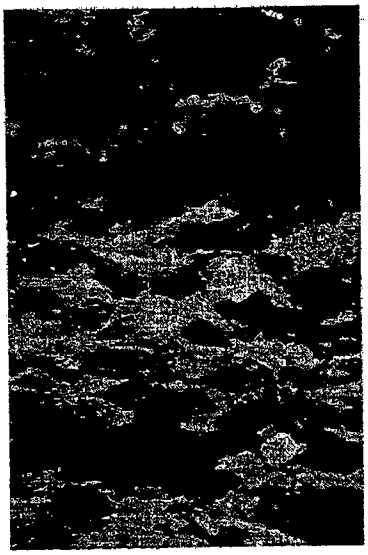
[57] **ABSTRACT**

A pet food product prepared from a fiber containing nutritionally balanced mixture of carbohydrate protein, fat, vitamins and minerals, the product having an expanded striated structural matrix which fractures when chewed by the pet. The product when chewed by the pet exhibits an improved mechanical tooth cleansing function whereby a substantial reduction in plaque, stain and tartar on the pet's teeth is affected. The product is prepared by extruding a plasticized mixture of food ingredients through a discharge passageway, the internal walls of which are maintained at a coefficient of friction no greater than 0.2 so that a condition resembling laminar flow exists in the extrudate.

11 Claims, 2 Drawing Sheets



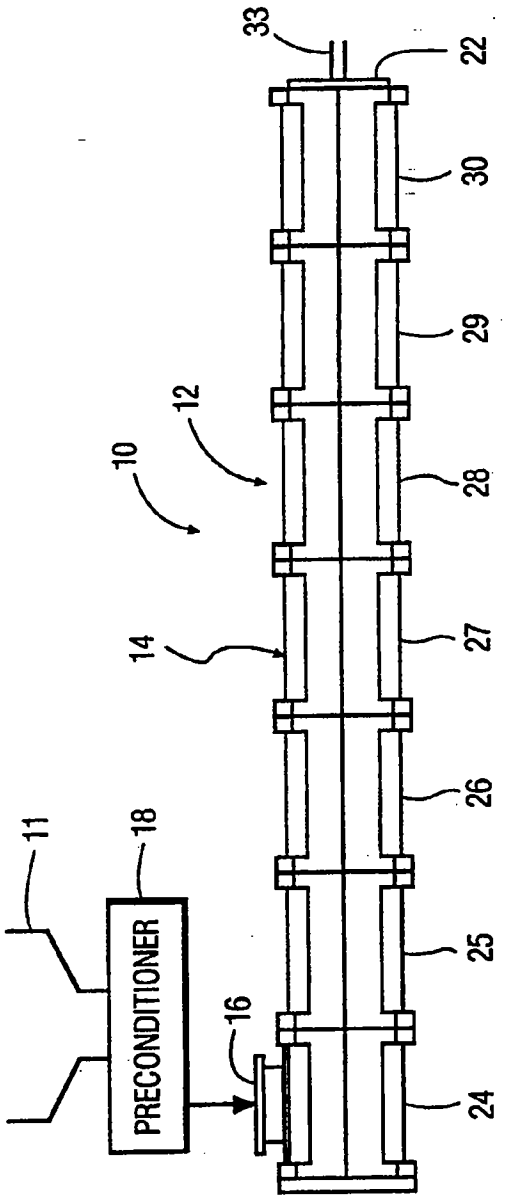


FIG. 1

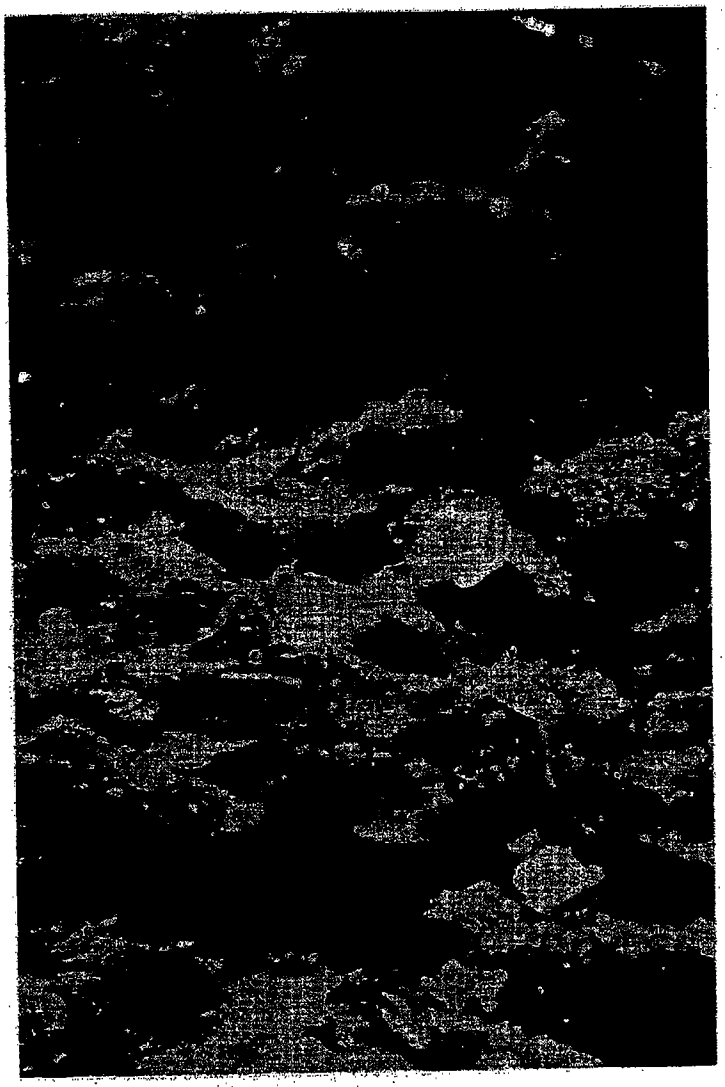


FIG. 2

PET FOOD PRODUCT HAVING ORAL CARE PROPERTIES

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates to a solid animal food product having a structural matrix which promotes oral care and hygiene in animals. In particular this invention relates to a pet food product having an expanded, striated structural matrix which when chewed by pets such as dogs and cats, imparts an improved mechanical dental cleansing benefit to the pet's teeth.

2. Description of the Prior Art

Animal pets, such as dogs and cats, like their human counterparts, are subject to dental health problems. These problems can be traced to the formation of bacterial plaque which forms on the exterior surface of teeth. Plaque is a water white gelatinous mass of sticky film of bacteria, polysaccharides and salivary proteins which is not easily washed away. Plaque is now generally recognized as the main culprit of poor oral health. Bacteria that produce the acid for the caries process are held to the tooth surface by the plaque matrix as well as other bacterial agents which cause redness and swelling (gingivitis). The presence of these bacteria, if left untreated, may spread to cause malodor, periodontal disease, gingival pockets and bone loss.

Dental calculus, or tartar, is the result of the thickening and hardening (mineralization) of dental plaque. Tartar which is not easily removed accumulates on the tooth surface, mainly at the gingival margin. It is a hard mineral deposit containing predominantly calcium and phosphate, very tightly bound to the tooth surface. Once it is formed, tartar is extremely difficult to remove except by a veterinary professional. Tartar can become unsightly if growth is left unimpeded, and elimination is desirable as the porous surface of the calculus will be covered by a thin layer of unmineralized plaque which can cause constant irritation of the gums and can trigger other problems once calculus is formed below the gum line.

Commercial animal pet foods, when chewed by the animal, do not provide sufficient mechanical surface cleaning to teeth to provide for plaque removal from the animal's teeth necessary for optimum dental health.

A variety of products are manufactured to provide animal pets with objects to chew or gnaw. They are intended to provide the pet with exercise for the teeth to maintain a healthy condition satisfying a need which arose when the natural pet food, raw meat, was replaced with processed pet foods. Rawhide strips knotted on the ends to resemble bones, for example, provide abrasion for cleaning teeth by removing tartar and massaging the gums, which is not provided by the typical canine dog food. The rawhide dog chews are expensive, and the indigestible leather fragments swallowed by the dogs frequently cause severe gastrointestinal blockage or diarrhea.

European patent 272,968 discloses a chewable product for dogs and other domestic animals wherein certain aqueous solutions of oral care agents, e.g., sodium fluoride (anti-caries agent), sodium benzoate (anticalculus agent) and bromochlorophene (antimicrobial/anti-plaque agent) are used to soak rawhide, beef tendon, or ligament. The solution treated product is then dried whereby the oral care agents are absorbed into the surface of the product.

U.S. Pat. No. 5,011,679 discloses a tartar preventing dog chew composed of raw hide having an edible coating containing an anti-tartar alkali metal inorganic phosphate.

U.S. Pat. Nos. 5,000,940 and 5,000,943 disclose baked dog biscuits containing an inorganic pyrophosphate salt, e.g., tetrasodium pyrophosphate salt, which when chewed and/or eaten by dogs cause a reduction in tartar accumulations on their teeth.

A disadvantage of the prior art baked pet oral care products is that they are hard and brittle products and, although abrasive and initially effective to remove plaque from teeth, quickly lose their effectiveness when chewed by the animal because rapid crumbling of the product during chewing leads to loss of abrasive contact of the product with the teeth.

There is therefore a need in the pet food field for a nutritional food product which is consumable without gastrointestinal complications and effective to abrasively remove plaque when chewed by pet animals such as dogs and cats.

SUMMARY OF THE INVENTION

This invention is directed to an extruded animal food product having an expanded, striated structural matrix which, when chewed by the animal, effectively removes tartar, stain and plaque on the animal's teeth through a mechanical cleansing action without causing gastrointestinal distress. When chewed, the striated product fractures along the striations whereby the animal's teeth are retained in increased abrasive contact with the fractured layers, the teeth being abraded and mechanically cleaned by the surfaces of the separated layers as the product is chewed by the animal increasing the time that the product is retained in mechanical cleaning contact with its teeth. The extruded striated product has a low moisture content and is preferably formed from an ingredient mixture of carbohydrate, fat, protein and fiber bearing ingredients and nutritional balancing ingredients such as vitamins and minerals.

During the extrusion process to prepare the food product of the present invention, the ingredient mixture is formed into an expanded, striated product by moving the mixture under plasticizing mechanical agitation and increasing levels of temperature and shear to form a flowable mass which is advanced through a discharge passageway, the inner walls of which have a coefficient of friction no greater than 0.2, to effect a flow state through the passageway resembling laminar flow, whereby the plasticized product is extruded as a continuous strand of product in an expanded and stratified condition with the fibers incorporated in the product flowing in transverse striations.

The strand of striated product is then segmented into discrete particles or pellets by cutting means upon exit of the strand from the extruder. The pellets are then conveyed to a drying system, e.g. heated air, and the moisture level reduced to about 11% or less.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of an embodiment of an extrusion apparatus which can be used to manufacture the animal food product of the present invention.

FIG. 2 is a photomicrograph (360× magnification) of a cross-section through the food product of the present

invention having fibrous striations transversely aligned through the matrix.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

To manufacture the striated food product of the present invention, one can advantageously use a heatable extruder having one or more transfer screws within a closed heatable barrel and a restricted extrusion discharge passageway such as a die, nozzle or pipe at the front end of the barrel, the internal walls of the passageway being maintained to have a coefficient of friction no greater than about 0.2. The barrel, in conjunction with the screw and die, creates during operation a closed chamber which prevents the release of existing water vapor from the food product and system. The food product mixture of carbohydrate, protein, fat and fiber bearing ingredients is first preconditioned and moisturized with steam and water and then subjected to a plasticizing combination of temperature, shear and pressure in the extruder barrel whereby the ingredient mixture is converted into a flowable mass. The advancing mass builds up sufficient shear to cause the plasticized mixture to be pushed at the desired temperature and pressure to and through the discharge passageway.

The plasticized mixture entering the discharge passageway from the transfer screw is subjected to compression and temperature sufficiently high so that the mixture is cooked as it flows through the discharge passageway. During the passage of the plasticized mixture through the discharge passageway, due to the low coefficient of friction of the internal walls, conditions of extrudate flow are induced which are believed to approximate laminar flow.

Laminar flow is distinguished from turbulent flow which is the normal flow condition of extruded plasticized animal food products. In turbulent flow, fluid elements are in chaotic motion, and small random fluctuations in the velocity at a point will exist even though the average mean velocity may remain constant along its axis. Laminar flow is a flow with constant preparation of streamlines so that constant velocity surfaces remain at constant separation and laminae or sheets of fluid slide frictionless over one another. By creating conditions during the extrusion of the product resembling laminar flow, the fiber bearing ingredients in the product of the present invention are aligned in transverse striations in the product matrix. In contrast, fiber-containing food products which are extruded under conditions of turbulent flow contain the fibrous ingredients randomly distributed in the food product. Such food product, when chewed by an animal, crumbles rather than fractures and exerts limited mechanical cleaning action on the animal's teeth.

During extrusion of the food product of the present invention, moisture in the extrudate is in a superheated state and flashes to steam when the extrudate leaving the discharge passageway has the compression suddenly relieved, the escaping steam swells and expands the extrudate, which exits the discharge passageway in the form of a thick strand ready to be segmented into pellets or the like.

By maintaining the inner walls of the passageway at a coefficient of friction no greater than 0.2, and preferably about 0.04 to about 0.1, conditions resembling laminar flow are believed to be induced during the extrusion of the plasticized fiber containing food product of the present invention, and as a result, an extrudate having a striated structural matrix is obtained; i.e., the extrudate product has fibrous striations transversely aligned through the product microstructure.

To maintain the walls of the discharge passageway at a coefficient of friction of no greater than about 0.2, the walls are desirably coated with a coating material such as polytetrafluoroethylene which has a coefficient of friction of less than about 0.2. Polytetrafluoroethylene coating materials have a coefficient of friction in the range of about 0.04 to about 0.1 are available commercially from E.I. Dupont de Nemours under the trademarks Teflon and Silverstone. Teflon has a coefficient of friction of about 0.04. Silverstone has a coefficient of friction of about 0.1.

Typically, a condition resembling laminar flow is obtained in the extrudate of the present invention by passing the plasticized food ingredient mixture, heated to a temperature of about 240° to about 320° F. and preferably about 270° to 300° F. at a relatively low velocity, e.g. about 12 to about 20 in./sec., preferably about 13 to about 17 in./sec. and most preferably about 14 to about 16 in./sec., through a discharge passageway having a length of about 2 to about 4 inches and a diameter of at least about 0.35 inches and preferably about 0.5 to about 0.75 inches, the inner walls of the passageway being coated with a layer of polytetrafluoroethylene.

The extruded food product of the present invention is a solid, uniform, expanded composition having fibrous striations extending transversely through the matrix microstructure. The food product, when chewed by the animal, unlike baked or other extruded products, does not crumble, but instead fractures along the matrix striations and hence offers the animal the intended teeth cleansing benefits stemming from the mechanical cleansing and other abrasive contacts with the separated matrix layers in the chewed striated product. In addition, as the striated fibrous product does not crumble as the animal chews on the product, the product clings in adhered contact with the teeth for an extended time prolonging the mechanical dental cleansing action.

The expanded, striated product of the present invention has a density of about 10 to about 35 lbs/ft^3, and a typical nutritional content as follows:

Ingredient	% by Weight
Carbohydrate	about 35 to about 70
Protein	about 10 to about 35
Fat	about 10 to about 20
Fiber	about 10 to about 25
Nutritional balancing agents such as vitamins and minerals	about 0.01 to about 0.40

In preparing the final product, the moisture content of the expanded extrudate is adjusted to the range of about 5 to about 11%. At moisture levels below 5% the product becomes too hard to be easily chewed by the animal and for this reason moisture levels less than 5% in the product are to be avoided. At moisture levels above about 11% the hardness of the product begins to decrease to levels at which the mechanical cleaning efficacy of the striated product begins to be compromised. Maximum mechanical cleaning efficacy of the striated product is achieved at a density preferably of about 20 to about 30 pounds (lbs.) per cubic foot (ft^3) and a fiber level preferably about 15 to about 20% by weight. At these fiber levels the product has the desired

degree of striation to achieve the desired degree of self-adhesion and tooth clinging characteristics.

To further improve palatability and energy (caloric) levels, the dried, extruded striated product may be coated with about 1 to about 13% additional fat.

While the striated product of the present invention can be any of several shapes, the shapes which are most desirable for mechanical cleaning efficacy include a cylindrical or disc shape. Disc-shaped pellets having thickness of about 0.32 to 0.70 inch, a diameter of about 0.7 to about 1.2 inch are most preferred in the practice of the present invention.

Suitable ingredients which may be used to prepare the animal food product of the present invention generally contain substantial amounts of animal protein derived from poultry by-products and high protein plant sources such as soybeans as well as fiber derived from sugar beet, soy and pure cellulose and substantial amounts of carbohydrates provided by cereals and grains such as wheat and rice as well as fats (animal or vegetable) such as tallow or soy oil. Small amounts of vitamins, minerals, salts, flavorings and preservatives are also generally included in the food product of the present invention to provide nutritional balance and palatability. A typical nutrient food product of the present invention is prepared from a mixture of the following ingredients:

Ingredient	% by Weight
Corn (Ground)	10–30
Rice Flour	30–50
Cellulose Fiber	15–25
Poultry By-product Meal	10–15
White Grease	
Inorganic Salts (NaCl, KCl, Ca_2SO_4)	0.5–2.0
Vitamins	0.01–0.2
Minerals	0.01–0.2
Preservative	0.01–0.2

In preparing the striated matrix animal food product present invention, the mixture of carbohydrates, vegetable and animal protein, fat, fiber and sufficient vitamins and minerals selected to yield a nutritionally balanced diet is mixed and preconditioned or moisturized within a preconditioner or mixing cylinder wherein the ingredients are contacted with steam and moisture. The moisturized mixture is then introduced into an extruder, which can be either a single or twin screw type extruder, which cooks the mixture to yield an extruded product. The extruder is provided with at least one helical screw therethrough which axially rotates to advance the material through the extruder.

In the pre-conditioner, the mixture of ingredients is subjected to steam and moisture in order to adjust the moisture content of the mixture to between about 15 and 30% by weight. The conditioned mixture is then mixed and extruded under conditions of elevated temperature e.g. about 100° to about 250° F. and pressure, e.g., about 100 to about 1000 psi through a shaped die or nozzle, the inner walls of which are maintained at a coefficient of friction no greater than about 0.2 to form a continuous strand of an expanded striated product that is segmented into discrete pieces or pellets by rotating knives or other cutting means upon exit of the strand from the extruder. The pellets are then dried at a controlled temperature, e.g. about 200° to about 300° F. to adjust the moisture level of the extruded product to about 5 to about 11% by weight and preferably 7 to about 9% by weight. The dried pellets have a density in the range of about 10 to about 35 lbs/ft^3. Thereafter the pellets may be tumbled in a coating reel and coated with a layer of animal and vegetable oil to increase the caloric content and palatability of the product.

In FIG. 1, there is shown one embodiment of an extrusion apparatus 10 which can be used to manufacture the expanded, striated food product of the present invention. The extrusion apparatus 10 includes an extruder 12 having a barrel 14 with an inlet 16 located below the outlet of a preconditioner 18; the extruder 12 also having an outlet 20 with a die 22. Hopper 11 is provided to pre-mix the ingredients prior to preconditioning. The barrel 14 as depicted comprises seven barrel sections 24, 25, 26, 27, 28, 30, although the number of barrels may vary without departing from the principles of the present invention. The barrel sections are interconnected to present an elongated bore through the barrel 14 of the extruder 12. Two co-rotating, flighted material advancing screws (not shown) are received in the bore of the barrel and are intermeshed along the majority of the length of the extruder barrel 14 and terminate in the die section 22. The screws feed material to and through the extruder assembly, including a die 22, at an appropriate velocity and in a state of laminar flow. Extrusion apparatus 10 of the type illustrated in FIG. 1 is available from the Wenger Manufacturing Company such as the Wenger TX 80 Twin Screw Extruder. The pre-conditioner 18 shown in the Figure is also manufactured by Wenger Manufacturing, Inc.

In preparing the expanded, striated product of the present invention, the ingredients from which the food product is extruded are first mixed in a mixer such as a ribbon mixer and fed to hopper 11. These ingredients include protein materials such as poultry by-product; carbohydrates such as corn, rice; and fiber such as cellulose fiber; vitamin mix and mineral mix. The mixed ingredients are metered to the preconditioner 18 and admixed with fats such as white grease which are fed directly into the preconditioner 18 at a rate between about 0.2 to 0.4 pounds/minute (lbs./min.). In the preconditioner 18, the mixture of ingredients is fed thereto at a rate between 600 and 1200 pounds (lbs./hr.) and is further mixed with water which is introduced into the preconditioner at a rate of 60 to 140 lbs./hr (1 to 2.3 lbs./min.). The temperature of the mixture is raised from ambient to 170° to 210° F. by the injection of steam into the preconditioner 18 at the rate of 60 to 160 lbs./hr. (1 to 2.7 lbs./min.). Total residence time in the preconditioner 18 generally ranges from 0.5 to 2.5 minutes.

Preconditioning the mixture with steam and water initiates hydration of the carbohydrate and fibrous ingredients which is completed by the mechanical working during the extrusion process.

Once the mixture of ingredients and water is introduced into the extruder barrel 14, the mixture is advanced along the length of the barrel 14 by axial rotation of the screws. The mixture is sequentially advanced through the extruder and finally through the die 22 at the outlet of the extruder 12, the inner walls of the die 22 being coated with a material having a coefficient of friction no greater than 0.2. The die 22 generally consists of an elongated tubular nozzle about 2.0 to about 4.0 inches long, having an inner diameter of about 0.5 to about 1.5 inch. The inner surfaces of the die 22 are preferably coated with a polymeric coating such as a fluorinated polyolefin resin such as polytetrafluoroeth-

ylene having a coefficient of friction of about 0.04 to about 0.1. By flowing the extrudate through the coated die at a velocity of about 12 to about 20 in./sec., a condition resembling laminar flow is created in the extrudate. As the food ingredient mixture passes through the barrel sections **24, 25, 26, 27, 28, 29,** and **30,** it is mixed, cooked and subjected to barrel temperatures in the range of about 100° to about 250° F. preferably about 170° to about 210° F. The build-up of plasticized food ingredient mixture transferred to the die **22** by the transfer screw causes pressures of about 100 to about 1000 psi to be applied to the mixture at the die opening. The extrudate is flowed through the die **22** at a temperature of about 240° to about 320° F. Total residence time in the die **22** is about 0.10 to about 0.35 seconds.

The extrudate strand **30** as it leaves the die **22** has a moisture content of about 10 to about 40% water by weight and preferably about 15 to about 25% water by weight. The extruded strand **30** swells upon exiting the die due to flashing of moisture to steam producing an expanded, striated structure. The strand is cut into 0.32 to 0.75 inch lengths to form pellets and then placed in an oven at 200° to 240° F. for 15 to 30 minutes to dry to about 5 to about 11% moisture. At this moisture level, the dried product has a density of about 12 to about 30 lbs/ft^3.

The invention is further illustrated by the following specific but non-limiting Example.

EXAMPLE

A solid, pelletized, nutritionally balanced dog food product having an expanded, striated structural matrix was prepared in accordance with the present invention by first mixing the following ingredients:

Ingredient	Weight %
Brewers Rice	42.220
Yellow Corn	22.895
Cellulose Fiber	19.300
Poultry by-product meal	13.993
Sodium Chloride	0.362
Potassium Chloride	0.362
Calcium Sulfate	0.603
Choline Chloride	0.121
Vitamin Mix	0.048
Mineral Mix	0.048
Ethoxyquin (Preservative)	0.048

The ingredients were blended in a ribbon mixer for five minutes and milled through a hammermill having screen size of 3/64 inch.

The milled mixture was fed to the hopper **11,** of a Wenger twin screw extruder (Model No. TX-80) equipped with a preconditioner **18.** The TX-80 extruder was of the type schematically illustrated in the Figure and was provided with two rotatable, flighted material advancing screws and had a total of 7 barrel sections and terminated in a spacer plate die converging to a 0.75 inch diameter die, 2.87 inches in length, the inner contact surfaces of which were coated with a layer of Teflon.

The mixture, having a moisture content of 10.40%, was fed to the preconditioner at a rate of 890.0 pounds per hour. The mixture was raised in temperature to 180° F. by the injection of steam introduced at a rate of 2.17 pounds per minute into the preconditioner. Water was introduced into the preconditioner at the rate of 2.13 pounds per minute. Choice white grease was added to the preconditioner at the rate of 0.3 pounds per minute.

The preconditioned mixture was fed into the inlet **16** of the extruder feeding zone. The screws of the extruder were rotated at a speed of 395 rpm.

Temperatures of the extruder barrel sections were maintained at 111° F., 154° F., 198° F., 168° F., and 183° F. and 162° F. for the second, third, fourth, fifth, sixth and seventh, barrel sections respectively. The mixture was advanced through the die at a temperature of 270° F. at a velocity of 17.9 in/sec.

Product rate through the die was 980 pounds per hour. The die issued the extrudate in the form of a strand 0.75 inch in diameter. The strand product swelled upon issuing from the die due to moisture in the extrudate flashing to steam. The strand was cut into 0.50 inch thick disc-shaped pellets. The pellets had an expanded structural matrix having fibrous striations transversely aligned through the microstructure with a water content of 23.6% by weight. The pellets were then conveyed to a forced air drying system and the moisture level reduced to 7.3% by weight at a temperature of 220° F. The dried pellets had a density of 26 lbs/ft^3. The dried pellets after exit from the dryer and prior to cooling were contacted with a liquid mixture of animal digest, choice white grease and soy bean oil heated at 120° F. within a coating reel at the following proportions:

INGREDIENTS	%
Dry pellets	86.9
Animal digest	5.0
Choice white grease	7.1
Soy bean oil	1.0

The pellets were tumbled in the coating reel for approximately 1 minute and had a uniform coating of the mixture absorbed on the pellet surfaces. The coated product was then removed from the coating reel and cooled to +10° F. of ambient temperature.

A group of 10 pure-bred beagle dogs (ages 1 to 6 years) were individually housed and fed one time per day 90–100 pellets (250 grams) prepared in accordance with the Example which was adequate to maintain the weight of each dog for a one week test period.

Throughout, and on completion of the test, the general health of the dogs remained good. No digestive upset or metabolic change was observed.

Prior to the feeding test, each dog had been given a thorough dental prophylaxis to remove existing soft and hard deposits on the buccal surfaces of the maxilla and mandible (a total of 22 teeth per dog).

The teeth of each dog in the group was examined for plaque, stain and tartar upon the completion of the test period.

In this examination, each tooth was divided horizontally into a gingival half (next to the gumline) and an occlusal half (away from the gumline). Plaque was scored visually on the corresponding tooth surfaces after staining with 3% erythrosin solution using the following criteria: 1, plaque coverage of up to 25% of the buccal tooth surface; 2, plaque covering between 25 and 50% of the buccal tooth surface; 3, plaque covering between 50 and 75% of the buccal tooth surface and 4, plaque covering between 75 and 100% of the buccal tooth surface.

The thickness of the plaque was scored as follows: Light=1, Medium=2 and Heavy=3. Coverage and thickness scores for each individual tooth surface were then multiplied, to give a total score for that tooth surface. Gingival and occlusal scores were added for each tooth. All tooth scores were added for each animal, then divided by the number of teeth scored to give a mean plaque score for the animal. A mean group plaque score was obtained by averaging individual scores of all animals in the group.

Stain was scored visually on the corresponding tooth surfaces after drying the tooth surface with a gentle jet of air using the following criteria; each tooth was divided vertically into 3 segments, mesial, buccal and distal; the coverage and color of the stain in each segment was then graded independently, 1, stain coverage of up to 25% of the (messial, buccal or distal) surface, 2, up to 50%; 3, up to 75% and 4, up to 100%. The stain color was scored 1, L (light), 2, M (medium) and 3, D (dark). Coverage and thickness scores for each individual tooth surface were then multiplied, to give a total score for that tooth surface. Mesial, buccal and distal segment scores were added for each tooth. All tooth scores were added for each animal, then divided by the number of teeth scored to give a mean stain score for the animal. A mean group stain score was obtained by averaging individual scores of all animals in the group.

Tartar was scored visually four area coverage on the corresponding tooth surfaces in the same manner as stain.

The plaque, stain and tartar scores for this group of dogs which were fed food product are recorded in Table I below. For purposes of comparison, the procedure of the Example was repeated with the exception that the dogs were fed dry commercial pelletized dog food available from two different manufacturers, the second commercial dog food being the leading commercial dry dog food. The commercial dog food products, when fed to the dogs, were observed to crumble rather than fracture when chewed by the dogs. The results of these comparative tests are also recorded in Table I.

TABLE I

	Mean Group Plaque Score	Mean Group Stain Score	Mean Group Tartar Score
Example	8.64	3.76	5.71
Commercial Dog Food I	12.29	6.83	7.43
Commercial Dog Food II	11.16	5.88	7.31

An examination of the scores recorded in Table I clearly show that the food product prepared in the Example, is significantly effective in reducing plaque, stain and tartar in dogs, especially when compared to the comparative commercial dry, pelletized dog food products.

The significance of the effectiveness of the dog food prepared in accordance with the practice of the present invention is demonstrated in Table II. Based on the mean group scores of Table I, the percent reduction obtained in plaque, stain and tartar obtained with the food products of the present invention (Example) as compared with the commercial comparative products are summarized in Table II below.

TABLE II

% REDUCTION IN PLAQUE, STAIN AND TARTAR ACHIEVED WITH DOG FOOD PRODUCT OF PRESENT INVENTION WHEN COMPARED TO COMMERCIAL DOG FOOD PRODUCTS

	% Plaque Reduction	% Stain Reduction	% Tartar Reduction
Commercial Dog Food I	29.7	44.9	23.1
Commercial Dog Food II	22.6	36.1	21.9

For purposes of further comparison, a dog food product was prepared in accordance with the procedure of the Example with the exception that the inner walls of the die used for the extrusion of the product were not coated with Teflon or any other low coefficient of friction coating; examination of the matrix of the product indicated that the fibrous ingredient was randomly distributed in the matrix.

The pelletized product, when fed to dogs, was observed to crumble rather than fracture when chewed by the dogs.

What is claimed is:

1. An animal food product comprised of a mixture containing proteins, fats, carbohydrates, fibers, vitamins and minerals the product having a matrix which, when chewed by an animal, is effective for removing plaque, tartar and stain from the teeth of the animal, the matrix being comprised of an extruded, expanded striated product having the fibers aligned in transverse striations through the matrix, the matrix being fracturable, and effective to induce a superior mechanical cleaning action on the animals teeth when chewed.

2. The food product of claim 1 wherein the product is prepared from a mixture containing about 35 to about 70% by carbohydrate, about 10 to about 35% by weight protein, about 10 to about 20% by weight fat and about 10 to about 25% by weight fiber.

3. The food product of claim 1 wherein the striated matrix has a density of about 10 to about 35 lbs/ft$_3$ and a moisture content of about 5 to 11% by weight.

4. A method of removing plaque, tartar and stain from the teeth of an animal which comprises preparing the animal food product of claim 1, and feeding the food product to the animal.

5. The method of claim 4 wherein the product is prepared from a mixture containing about 35 to about 70% by carbohydrate, about 10 to about 35% by weight protein, about 10 to about 20% by weight fat and about 10 to about 25% by weight fiber.

6. The method of claim 4 wherein the striated matrix has a density of about 10 to about 35 lbs/ft^3 and a moisture content of about 5 to 11% by weight.

7. The food product of claim 1 wherein the fiber is cellulose fiber.

8. A method of preparing an animal food product which is effective for removing plaque, tartar and stain from the teeth of an animal which comprises preparing a food mixture containing carbohydrates, proteins, fats and fiber bearing ingredients, working the mixture under mechanical pressure and heat sufficient to convert the mixture to a plasticized flowable mass and discharging the mass through a die, the internal walls of the die being maintained at a coefficient of friction of from 0.04 to 0.2 so as to obtain an expanded extrudate product having the fiber bearing ingredients aligned in transverse striations through the matrix which, when

chewed by an animal, fractures and imparts an improved mechanical cleansing action to the animal's teeth.

9. The method of claim 7 wherein the inner walls of the discharge passage is coated with a fluorinated polyolefin.

10. The method of claim 9 wherein the fluorinated polyolefin is a polytetrafluoroethylene.

11. The method of claim 8 wherein the fiber bearing ingredients are cellulose fiber.

* * * * *

EXHIBIT E

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Cupp et al.
Appl. No.: 10/037,941
Conf. No.: 7917
Filed: January 3, 2002
Title: DENTAL DIET FOR REDUCING TARTAR
Art Unit: 1761
Examiner: K. Hendricks
Docket No.: 115808-330

SUPPLEMENTAL AFFIDAVIT UNDER 37 C.F.R. § 1.132

Sir:

I, Carolyn J. Cupp, hereby state as follows:

1. I am one of the named inventors of the above-identified patent application and am therefore familiar with the inventions disclosed therein.

2. This Affidavit supplements the previously submitted Affidavit under 37 C.F.R. § 1.132 signed by me on January 26, 2006 (the "*Affidavit*") and submitted along with a response to the Patent Office on February 1, 2006, which is hereby incorporated by reference.

3. The present claims are directed to, in part, a dry pet food that will reduce tartar when chewed by the pet. It has been surprisingly found that an unstriated pet food in accordance with the present invention having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3 increases the removal of plaque and tartar build-up.

4. As one having ordinary skill in the art, I believe that *Collings* fails to disclose or suggest a pet food product having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3. Instead, I believe *Collings* is directed to an expanded pet food product having a low density texture.

5. Approximate calculations to arrive at the density of the pet food product taught by *Collings* were performed based on information derived from Example 1 in *Collings* along with reasonable estimates by one skilled in the art of the type of product container and filling of the pet food not explicitly given by *Collings*. A copy of the calculations based on different the assumptions of the type of product container and filling of the pet food is attached hereto as Exhibit B.

6. Pet food density calculations were performed using several assumed values regarding the weight and thickness of the container holding the pet food in Example 1 in *Collings*. The assumed values for the containers were based on the typical pet food containers used to hold the category of pet food as taught by *Collings*. Accordingly, the dimensions of an applicable pet food package described by *Collings* having good stacking capabilities, recloseable lid and good barrier properties were used. Pet food density calculations were also performed using a reasonably assumed void space of 10% for the filled product in the container. As observed in Exhibit B, all of the calculations give *Collings'* pet food product a density at or below 12 lbs/ft^3.

7. For the foregoing reasons, as one having ordinary skill in the art, I believe that *Collings* fails to disclose or suggest a pet food product having a density that ranges from about 16.8 lbs/ft^3 to about 20 lbs/ft^3.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, Title 18, United States Code, and that willful false statements may jeopardize the validity of this patent and any patent issuing therefrom.

Date: 8-1-06

Carolyn J Cupp

Name: Carolyn J. Cupp

EXHIBIT B

Density Calculations for Collings Patent

External	Inches	cm	m	
Diameter	5	12.70	0.1270	
Height	8	20.32	0.2032	
	in^3	cm^3	m^3	ft^3
Calculated Volume	157.08	2574.07	0.00257	0.091
	Pounds	grams	kilograms	
Reported Weight of Filled Container	1.1	500	0.5	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Average Density	12.10	0.194	194.24	194.24

Scenario 1

What if ...	Pounds	grams	kilograms	
Weight of Container	0.28	127.84	0.13	
Weight of Product	0.82	372.16	0.37	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Density of product	9.01	0.145	144.58	144.58

Scenario 2

What if ...	Pounds	grams	kilograms	
Weight of Container	0.27	120.74	0.12	
Weight of Product	0.83	379.26	0.38	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Density of product	9.18	0.147	147.339	147.34

Now, what if ...

Calculated volume is too high in being based on external dimensions?
Lets assume the container has a thickness = 4 mm
= 1.57E-01 inches

Then ...

Inner dimensions	Inches	cm	m	
Diameter	4.69E+00	11.90	0.1190	
Height	7.69E+00	19.52	0.1952	
	in^3	cm^3	m^3	ft^3
Calculated Volume	132.48	2171.02	0.00217	0.077

Scenario 1	Pounds	grams	kilograms	
Weight of product	0.81875	372.16	0.372159091	
	lb/ft^3	g/cm^3	kg/m^3	g/l

Average Density	10.68	0.171	171.42	171.42

Scenario 2	Pounds	grams	kilograms	
Weight of product	0.834375	379.26	0.379261364	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Average Density	10.88	0.175	174.69	174.69

Scenario 1A

Suppose the container contains about v% voidage and has been evacuated (not said by Collings)
Then the true density of the product alone can be estimated as follows:

Void space "v" 10%

	in^3	cm^3	m^3	ft^3
Calculated Volume	119.24	1953.92	0.002	0.07

Scenario 1A	Pounds	grams	kilograms	
Weight of product	0.819	372.159	0.372	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Product Density	11.87	0.190	190.47	190.47

Scenario 1B

Suppose the container contains about v% voidage and has been evacuated (not said by Collings)
Then the true density of the product alone can be estimated as follows:

Void space "v" 10%

	in^3	cm^3	m^3	ft^3
Calculated Volume	119.24	1953.92	0.00	0.07

Scenario 1A	Pounds	grams	kilograms	
Weight of product	0.834	379.261	0.379	
	lb/ft^3	g/cm^3	kg/m^3	g/l
Product Density	12.09	0.194	194.10	194.10